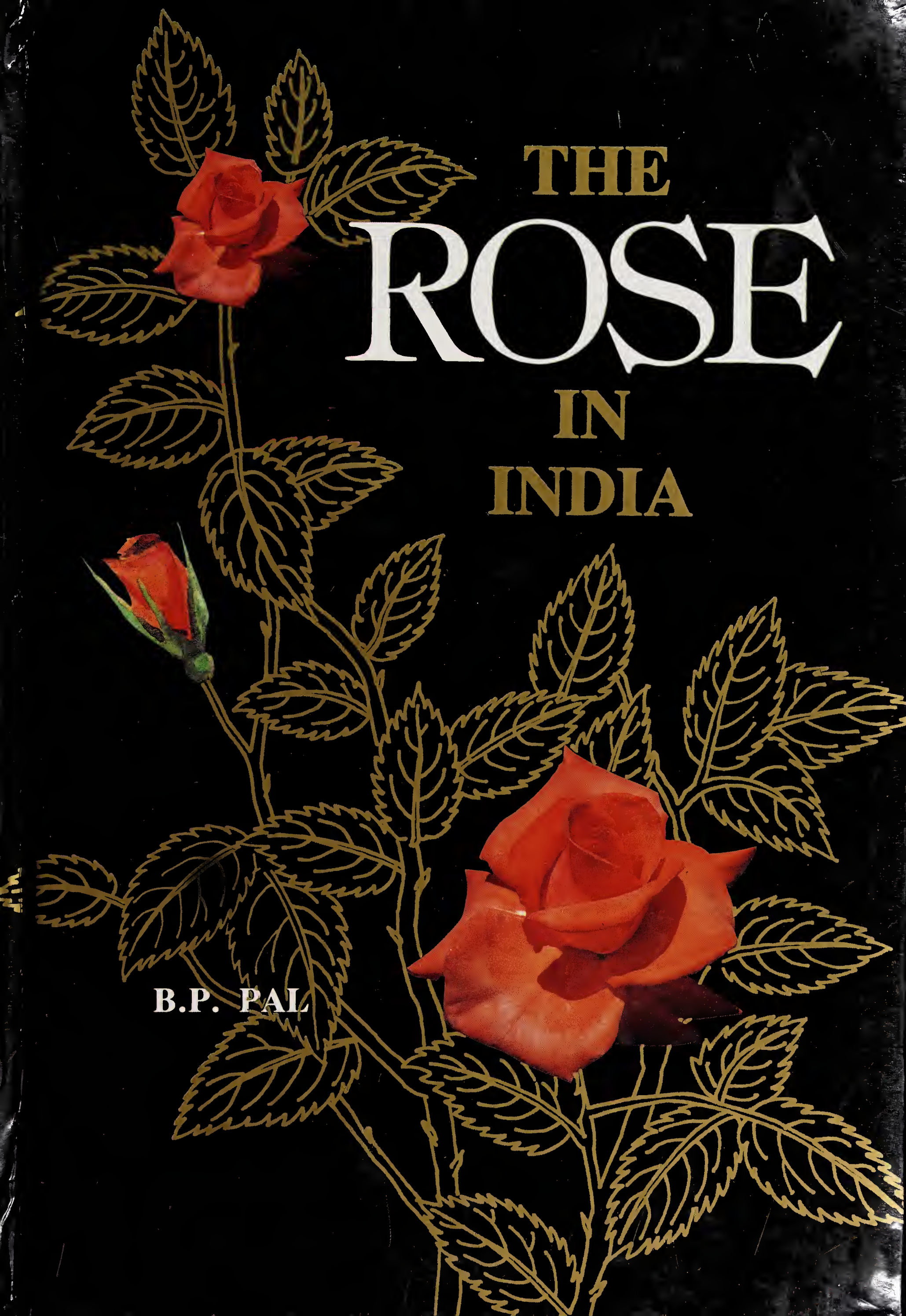
THE ROSE IN INDIA



B.P. PAL

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THE ROSE IN INDIA



'Paradise' (H.T.)

The glorious colours of 'Paradise'. Large, perfectly shaped flowers of silvery-lavender become edged with rich ruby-red as soon as sunlight falls on them. Superb both as a garden rose and for exhibition.

THE ROSE IN INDIA

B.P. PAL

President Emeritus, Rose Society of India
Member, Royal National Rose Society
Member, American Rose Society

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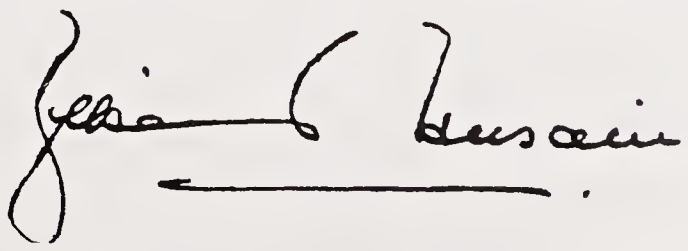
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To
JAWAHARLAL NEHRU
Lover of the Rose

FOREWORD

If there were no roses how much the poorer this world would be! The rose has been loved and cherished from very ancient times. But in the modern age its importance has become still greater because rose breeders have been increasing its range of colours while at the same time adding valuable characters like disease resistance and a longer period of flowering. There are now roses for every purpose and even the person with only a tiny plot of land will find that there are varieties available to him which will provide a welcome splash of colour to a wall, or furnish quantities of exquisite cut flowers.

Roses grow wild in some parts of India, especially in the mountains. But there is not, as far as I know, much mention of cultivated garden roses in literature until the time of the Moguls. They appear to have brought with them the love of roses from Persia, a country which has been renowned for this flower from time immemorial; indeed the Persian Yellow Rose is the ancestor of some of our enchanting modern varieties. Nowadays roses are grown throughout the country and perhaps no flower is more loved in India. However, conditions are very different from those in Europe, America and other countries with a similar climate, for which numerous books on roses are available. It is therefore that this book, written from an Indian viewpoint, is very welcome. The author, who has won numerous awards for rose exhibits in Flower Shows and Rose Shows in New Delhi, is a well-known rosarian and currently the President of the Rose Society of India. To the writing of this book he has brought his scientific training and considerable practical experience, and I have no doubt that this publication will be of interest and value to rose gardeners and rose-lovers throughout our country.



New Delhi
August 18, 1964

ZAKIR HUSAIN

PREFACE TO THE THIRD EDITION

WHEN I took courage in both hands and accepted the invitation of the Indian Council of Agricultural Research to write a book about roses in India, I knew I had taken on a tough task. But as a 'rose man' I also realized that the assignment could just not be refused. I likewise knew that I could count on the willing and generous help of a large number of persons. The book came into being: the first edition was published in 1966, the second in 1972. I was gratified at the reception the book received. Since the demand for the book continued long after it went out of print, the question whether another revised edition should be brought out received consideration. Though unfortunately the blocks of the colour plates of the earlier editions were no longer available, the ICAR decided that a fresh set of photographs may be taken and the updating and enlargement of the book should be taken up on a priority basis. This has been done.

Apart from general revision, the chapter on Indian rose varieties has been expanded. The list of recommended varieties has been enlarged to cover a large number of soil-climatic regions; a write-up on export of roses has been incorporated in view of the rapidly increasing interest in the subject. Almost all the colour plates are new, having been taken specially for this edition of the book.

I should like to point out that the book is not a research treatise though a few references to scientific literature have been provided; it is certainly not an encyclopaedic tome; also, at the other end, it is not a "how-to-do-it" book for the absolute beginner brimming with enthusiasm but entirely innocent of garden lore—for this category of persons the small location-specific paperbacks are much more useful.It is just a book about roses—about roses in India.

As I expect my book to be read mainly in India, I have used the word 'variety' rather than the botanically more correct term 'cultivar' with which most people in this country—I am not referring to botanists and horticulturists—are unfamiliar.

For a similar reason, I have refrained from using the new classification for modern garden roses which has been adopted in a

few countries. The non-botanical classification is meant for gardeners and is based on the qualities that matter in the rose garden. I felt that in the Indian situation it was desirable, at least for some time more, to continue the present practice of classifying roses into Hybrid Teas, Floribundas, Polyanthas, etc. Even in a country with such a long history of rose-growing and holding Rose Shows as England, the reception of the new classification has been, to put it mildly, very mixed.

I have also generally adopted the metric system of measures, though in some cases the equivalents used in Britain and some other countries of the world are also given.

It is my hope that some copies of this book will cross the seas and be seen by and interest those who cherish the rose in other continents. To many of them India is *terra incognita* as far as roses are concerned. I would not, however, blame them for this, for the principal reason for this state of affairs has been the paucity or even total lack of books and other material on the subject. I would feel very happy indeed if my book generates greater interest in roses in India.

New Delhi
December 8, 1987

B.P. PAL

PREFACE TO THE SECOND EDITION

As I remarked in my Preface to the First Edition, I wrote this book with considerable hesitation because with so many excellent books available on the subject of roses, and some of them really so outstanding, it seemed both arrogant and presumptuous to venture into this field. Also, I do not know enough about roses in the many varied regions of this country in which they are grown. But the very warm welcome which it received, exceeding by far my most optimistic expectations, indicated, I think, that there was room for a rose book which, while giving information on varied aspects of roses and rose-growing, gave special attention to the conditions prevailing in this subcontinent. In this edition I have tried to emphasize this aspect further, and, in particular, I have collected and summarized information on the varieties raised in this country about which little is known outside its frontiers.

I have revised the descriptive list of varieties, regretfully leaving out some of the older ones, or those which have not done particularly well in India, to make room for new ones. Both the colour and the black-and-white plates have likewise been adjusted to provide not only a selection of some of the most recent varieties, but also a larger number of Indian-raised roses. Changes have been made too in some of the other chapters in the light of more up-to-date knowledge. Besides the rosarians mentioned in the Preface to the First Edition, I must mention that Raja Surendra Singh, of Nalagarh, Dr Vishnu Swarup, Mr J.P. Agarwal, Mr O.P. Bansal, Mr K.B. Sharma, Mr Bal Raj Arora, Mr Vinod Arora, Mr Swadesh Kumar and Mr Romesh Chandra have been among the knowledgeable people with whom I have discussed roses, and I must not forget the great Australian rose expert, Dr A.S. Thomas, who has visited India in the past few years and has given us the benefit of his rich experience. I also had fruitful talks with Mr Kasturi Rangan, to whom a reference was made in the Preface to the First Edition, and who is now one of the leading rose breeders of the country.

The chapter on pests has been revised in consultation with

Dr S. Pradhan, and that on diseases in consultation with Dr S.P. Raychaudhuri, who was assisted by Dr J.S. Grewal and Dr M.L. Sawhney. Owing to a very regrettable piece of inadvertence the name of Dr H.K. Jain, who assisted considerably in drafting the portion on the genetical aspects of roses and rose breeding, was omitted in the first edition. I have great pleasure now in acknowledging my debt to him. I am thankful to the staff of the Division of Vegetable Crops and Floriculture for supplying me with the information on which the new chapter on Roses for Export is based. As in the previous edition, the majority of the photographs have been taken by Mr H.K. Gorkha, again, mostly in my garden. I wish to express my deep appreciation and gratitude to him. The photographs in Plate Nos. 6, 7 and 61 were taken by Mr K.M. Vaid, Mr J.N. Sharma and Mr Gurcharan Singh, respectively, to all of whom credit is due.

Mrs P.P. Trivedi has been of great help in matters connected with various aspects of production of this edition. In the Preface to the First Edition I had referred to the help received from the editorial staff of the Indian Council of Agricultural Research. In the case of the present edition it gives me great pleasure to acknowledge in special the splendid work done by Editor Mr S.N. Tata, Chief Production Officer Mr Krishan Kumar, and Chief Artist Mr N.S. Bisht.

New Delhi
December 30, 1970

B.P. PAL

PREFACE TO THE FIRST EDITION

WHEN I was invited by the Indian Council of Agricultural Research to write a book on roses for India, I accepted the invitation with some diffidence. Conditions differ so much from region to region in this subcontinent and the information available regarding the performance of various rose varieties is so meagre that I wondered if I could at all do justice to the subject. At the same time I knew that there was a persistent demand for knowledge about roses. Rose-lovers want to know about the varieties they should try and the methods of growing them. Although commensurate with the importance of the rose a large number of books, some of them very good indeed, have been published abroad, there are, with only an exception or two, none particularly intended to deal with roses in India. In view of this I agreed to attempt to write this book.

My experience has been chiefly with roses in Delhi and the surrounding regions. This, of course, is one of the most important areas where roses are cherished and grown to perfection. I have also had a few years' experience of growing roses in north Bihar, where the temperatures in summer and winter are a little less extreme than in Delhi, and the rainfall is a little more. As a boy, my first attempt at cultivating roses was in the plains of Lower Burma, in a garden on a stiff clayey soil; the climate was warm, with almost no winter, and there was heavy monsoon rain. There I was able to grow successfully, among others, 'Frau Karl Druschki', 'Gloire de Margottin' and 'Climbing Captain Christy', the last with enormous, somewhat flattened flowers of a soft flesh-pink. I still grow the first-named variety, also called 'Snow Queen', but am not able to get the other two. 'Gloire de Margottin' was, I know, a Hybrid Perpetual, and continuously gave deliciously scented bright-red flowers.

I have tried to supplement my knowledge by visiting rose gardens when travelling in different parts of India—for instance, Bangalore, Bombay, Calcutta, Deogarh, Indore, the Kulu Valley, Patna, Poona and Simla. I have benefited by discussions with rosarians, including Mr J.S. Monga, Mr G.E. Puech and Major L.M.

Vasisth. I have also tried to collect information by writing to a number of people. For the performance of rose varieties in the more tropical areas, especially in eastern India, I have consulted B.S. Bhatcharji's book, *Rose Growing in the Tropics*. However, I am painfully conscious that I cannot say that I know of roses all over India, or of all their aspects. But the completion of my task has been made possible by generous assistance and co-operation from a large number of persons.

Dr Vishnu Swarup assisted considerably in drafting the chapter on How to Plant and Grow Roses and in preparing the descriptive list of roses; in the latter task, Mr R.S. Malik also helped. Dr S. Pradhan, assisted by Professor N.C. Pant and Mr K.M. Peshwani, provided the material for the chapter on Pests, and Dr D.N. Srivastava and Mr S.B. Mathur for that on Diseases. Dr N. P. Datta helped me in preparing the part dealing with soils and fertilizers, and Professor K.C. Gulati in that relating to rose-water and rose-oil. Mr H.B. Singh provided notes on the wild roses of India. Dr M.S. Swaminathan read the chapter on Rose Breeding, and Dr S.K. Mukherjee that on Propagation. Dr M.S. Randhawa also made some helpful suggestions. To Dr H. Santapau, and to Dr K. Subramanyam, of the Botanical Survey of India, I am indebted for information on the valid names, synonymy and distribution of wild rose species. To Mr L.G. Turner, of the Royal National Rose Society, I am obliged for information on the raisers and years of introduction of certain varieties.

Useful information was given by Mr Kasturi Rangan on rose-growing practices in the Bangalore area; Mr S. Percy-Lancaster on rose varieties (early history) in Calcutta; Mr S.K. Bhattacharjee on roses for the cut-flower market in Calcutta; Mr Bhanu L. Desai and Mr S. D. Vaidya on roses for the cut-flower market in Bombay; Professor L.S.S. Kumar on roses in southern India; and Dr K. Ramiah on roses in the Bangalore area.

I must specially thank Mr H.K. Gorkha for taking the photographs. He took pains to capture the 'personality' of each variety. All the photographs are his handiwork, except Plate Nos. 11, 12 and 78, which were taken by Mr J.N. Sharma, Mr K.M. Vaid and myself respectively. Dr S.P. Capoor supplied the photograph of Fig. 15 on

Powdery Mildew. I am also deeply grateful to Mr N.S. Bisht for making the line drawings and for assisting in the lay-out of the book.

My warm thanks are due to Julia Clements for granting permission to quote two recipes from her book *My Roses*, and to the World's Work (1913) Ltd, Surrey, England, for allowing me to reproduce two formulas from *The Complete Book of Flower Arrangement* by F.F. Rockwell and E.C. Grayson.

Finally I must acknowledge my gratitude to the Indian Council of Agricultural Research for making possible the publication of this book. I wish specially to thank Mr A.D. Pandit, Vice-President, for encouragement, and the editorial staff for many helpful suggestions.

New Delhi
August 15, 1964

B.P. PAL

ACKNOWLEDGEMENTS

My sense of obligation and deep gratitude to all those persons mentioned in the Prefaces to the First and Second Editions remains, for without their full-hearted co-operation the book would not have been written and published. I would like to reiterate my indebtedness, for the present edition is based to a large extent on the material presented in the earlier editions. However there has been a sizable amount of revision and re-writing, and also additions made on certain aspects, which it is hoped have added to the interest and usefulness of the book. Many persons with rich experience and deep knowledge have again willingly contributed to this and I cannot adequately express my profound thankfulness to them.

Referring to the textual material, I must acknowledge with most grateful thanks the valuable expert opinion and advice regarding rose varieties received from Mr S.N. Achanta, Mr O.P. Bansal, Mr J.S. Monga, Dr G.S. Randhawa and Mr K.B. Sharma, given in Chapter 5 in respect of the northern and central region of the great northern plain; from Swami Vinayananda and his collaborators namely Dr Kalyan Chakrabarti, Capt. Subimal C. Dey and Mr Krishna Pada Mukherjee for the eastern portion of the northern plain; from Lt Col. C.P. Diddi, Honorary Secretary, the Indian Rose Federation, in respect of the central area; from Mr M.S. Pai, former President, Bombay Rose Society, and Mr V.S. Pandhye, former Vice-President and Editor of publications of the Indian Rose Federation, for the western region. I must also gratefully acknowledge the useful information regarding soils in certain regions of the country received from Dr N.N. Goswami, Dean and formerly Head of the Division of Soil Science and Agricultural Chemistry of the Indian Agricultural Research Institute. For the expert guidance I needed for revising some of the chapters, I place on record my deep gratitude to Dr M.P. Nayar, Director, Botanical Survey of India, Calcutta, for requesting on my behalf, Dr G. Panigrahi, a very senior botanist of the Survey to go into matters connected with the identification and

connected aspects such as distribution of the wild rose species of India in great depth. Though I could not use most of the very technical material kindly provided by Dr Panigrahi in this book, I am grateful for the warm response to my request. Dr R.K. Arora, of the National Bureau of Plant Genetic Resources, New Delhi, also helped in drawing up the descriptions of wild rose species and I must express my thanks for this. In the vital area of plant protection, I am deeply obliged to Dr K.N. Mehrotra of the Division of Entomology, and Dr J.S. Grewal and Dr Dharam Vir of the Division of Mycology and Plant Pathology, all senior experts of the Indian Agricultural Research Institute.

With special pleasure I acknowledge the contribution of Dr Akhtar Husain, Director, Central Institute of Medicinal and Aromatic Plants, Lucknow, for updating the sections on Rose-Water and Rose-Oil; likewise I place on record my deep debt to Dr Vishnu Swarup, Research Director, Indo-American Hybrid Seeds, for his note on export of roses which is reproduced as an appendix in Chapter 22.

The chapter on Indian rose varieties has been completely recast. While I wrote the narrative on rose breeding in India, the accompanying table was drawn up with the assistance of Mr A.P. Singh and Dr N.K. Dadlani. The general list of roses was mainly the work of Dr N.K. Dadlani though Mr A.P. Singh also assisted in the early stages. I am very grateful to them.

The appeal of a book like the present one depends in great measure on the illustrations, particularly the colour plates which must convey to the reader's eyes as faithfully as possible the glowing colours of which the range in roses is truly remarkable. In the last two editions I had the services of that very talented photographer, the late Mr H.K. Gorkha of the Indian Agricultural Research Institute. As stated earlier, the blocks for printing the original colour pictures were now no longer available; some colour transparencies were, however, found but in most of them the colour had undergone deterioration because of the lapse of time. Only a few of the late Mr Gorkha's transparencies could be used for this edition (Plate Nos. 21, 35, 42, 64 and 98). Fortunately, with the permission of Dr N.S. Randhawa, Director-General of the Indian Council of Agricultural

Research, new colour photographs were taken by Mr Gurcharan Singh, Senior Photographer (Plate Nos. 2, 13, 16-18, 22, 25, 29, 36, 40, 41, 43-46, 54, 57, 58, 60, 68-73, 80-83, 86, 92 and 111), and Mr Shiv Kumar (Plate No. 95), both of the Indian Council of Agricultural Research. Besides these, a number of colour transparencies taken by the staff of the Photo Laboratory of the Indian Agricultural Research Institute were also made available to me by the Head of the Division of Floriculture and Landscaping (Plate Nos. 31, 33, 47, 79, 105 and 115) and the successive Project Co-ordinators, All-India Co-ordinated Project on Floriculture, namely Dr R.S. Malik and Dr Brijendra Singh (Plate Nos. 12, 19, 20, 28, 30,49, 66, 67, 74 and 75). Mr D.S. Rawat of the same Photo Laboratory took a couple of photographs specially for this book (Plate Nos. 14, 38, 102, 107 and 112). I am deeply grateful to Dr A.M. Michael, Director of the Institute, for permitting this. Photographs were also taken at my request by Dr Virendra Kumar, Senior Reader in Botany, Zakir Husain College, Delhi (Plate Nos. 1, 3, 5, 6, 32, 34, 39, 55, 59, 78, 97 and 109), Mr Ashok Dilwali, New Delhi (Fontispiece, Plate Nos.27, 48, 63, 65, 84, 85, 93, 96, 100, 101, 103, 104, 106, 110 and inset of 111), and Mr H.V. Sarda, also of New Delhi (Plate Nos. 10 and 11). To all these talented photographers a deep debt of gratitude is due.

I would also like to tender my special thanks to Mrs P.L. Airun, Anand Nursery, Jaipur, Mr M.S. Viraraghavan, Kodaikanal, Dr Y. K. Hande, Pune, and Mr B. Bose, Burdwan, for letting me use colour transparencies of rose pictures taken by them (Mrs Airun: Plate Nos. 26, 76 and inset of 79; Mr Viraraghavan: Plate Nos. 23 and 37; Dr Hande: Plate No. 24; and Mr Bose: Plate No. 108).

The largest number of pictures were taken at New Delhi at the Indian Agricultural Research Institute by the permission of the Director. Some were also taken at the National Rose Garden, Chanakyapuri, New Delhi, by courtesy of the Rose Society of India. A few were taken in the terrace garden at my residence.

Apart from the matters referred to above, as a now elderly person I needed assistance in getting a number of things done like looking up references, arranging for the typing of revised or new passages of the text, in handling the large number of transparencies, and assembling the final material in a form in which it could be

presented to the publishers, Dr N.K. Dadlani of the Co-ordinated Floriculture Project did this most willingly and efficiently. I am deeply grateful to him.

Finally, it is my pleasant duty to express my deep gratitude to the Indian Council of Agricultural Research, the publishers of this book. To the Director-General, Dr N.S. Randhawa, I wish to place on record my appreciation of his warm interest which facilitated the progress of the book. I cannot adequately thank Mr Krishan Kumar, Director, for the care he has bestowed and for his untiring efforts, using his rich experience, to bring the production of the book to a high standard. To Chief Editor, Mr S.N. Tata, I am indebted for his meticulous and perceptive editing. Again, to Mr M.K. Bardhan credit is due for the new line drawings and for the imaginative handling of the lay-out.

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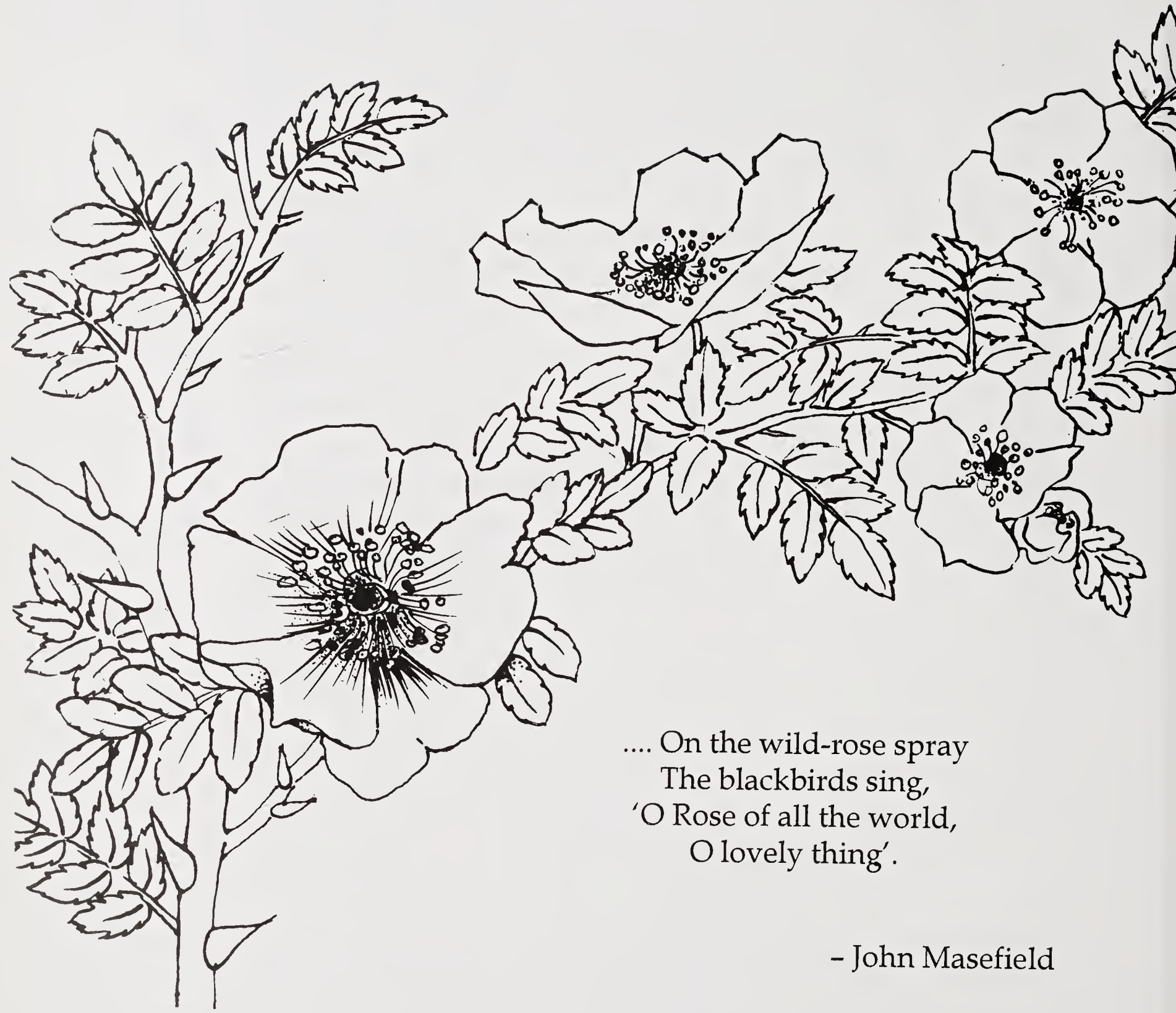
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.... On the wild-rose spray
The blackbirds sing,
'O Rose of all the world,
O lovely thing'.

– John Masefield

CHAPTER 1

THE ROSE

Its Beauty and Popularity

SOME words instantaneously suggest beauty because they are associated with things that afford pleasure and delight. The word ROSE is one of them. Many people, whether they possess gardens or not, are thrilled by the beauty of flowers. And which flower is fairer than the rose?

Flowers are among the loveliest objects on this earth of ours. And among them the rose is the queen. As Haynes has said, 'Ever since man first beheld it and inhaled its scent, the rose has captured his imagination and taken root in his thoughts'. Why has the rose been preferred to all other flowers? In the beginning of its history, when the rose was a wild flower, rather simple in form and with a limited colour range, it must have been the fragrance that endeared it to man.

John Keats said

> And the Rose herself has got
> Perfume which on earth is not

Percy Bysshe Shelley was obviously referring both to the scent and the entrancing beauty of the opening rose bud, when he wrote:

> And the rose like a nymph to
> the bath addrest,
> Which unveiled the depth of
> her glowing breast,
> Till, fold after fold, to the
> fainting air,
> The soul of her beauty
> and love lay bare.

In modern times, however, the answer must be different. As a result of breeding work for several centuries, the rose has attained a wealth of form, ranging from the simple, five-petalled flower to the breathtakingly beautiful exhibition type of the show-bench, with a spectrum of colours in which only true blue and true black are missing; from miniature forms only a few centimetres high to tall shrubs and vigorously rampant climbers and ramblers that can clothe vast stretches of walls or clamber up tall trees. Although the delightful fragrance associated with the name—did not Juliet say, 'a rose by any other name would smell as sweet'—is sometimes absent, or is faint and elusive, there still are many varieties which delight the senses.

Interest in roses continues to increase throughout the world. One firm in the United Kingdom plants 1,000,000 root-stocks every year for budding. In America, where great strides have been made since Charles Dingee started his rose nursery at West Grove in 1854, a famous firm of nurserymen has several rose farms, one of which occupies no less than 810 hectares (2,000 acres). According to a recent statement of Dabney Otis Collins, 'an estimated 100 million rose plants are sold each year, and the number is increasing'. By the end of 1968 the Royal National Rose Society of the United Kingdom had 118,450 members. The number has since decreased for various reasons, but the Society continues to maintain its position of eminence.

Famous Rose Gardens

In Europe and America, and perhaps in some other continents too, there are rose gardens which are pure enchantment. The visitor is enthralled and takes back a memory that will be cherished for years. Perhaps the most famous of all is the Bagatelle in the Bois de Boulogne in Paris, on the site where the Comte de Artois built an exquisite house and garden in record time, to win a bet with Marie Antoinette. Not far away, at La Haye, is another famous rosary, the Roseraie de l'Haÿ, which is reported to possess the most extensive collection of rose varieties in Europe.

The Parc la Grange at Geneva is well known. Established in 1946, it contains about 12,000 rose bushes. Wonderfully situated by

the lake, it is illuminated at night at the height of the rose season. Among the roses, ballets, operas and concerts are performed, and sometimes even a fashion show. In the United Kingdom, the Gardens of the Rose at St Albans, which is the headquarters of the Royal National Rose Society, is one of the most outstanding rose gardens in the world, and so is the Queen Mary's Rose Garden in Regent's Park, London. In Eire the roses at Russborough are justly famous. In Madrid, in Spain, the Rosaleda in the Parco del Ouest is famed for its pergolas and tunnels of roses. There are also many other very fine rose gardens in Europe, in France, in Belgium, in the Netherlands, in Denmark and Germany. In America the premier position is usually accorded to the rose garden at Portland, in Oregon. Other well-known gardens are at the Elizabeth Park in Hartford, Connecticut, the Descanso Garden in Los Angeles, and the Tyler Municipal Garden in Texas. The formal garden at Hershey is also famous. In India we do not have rose gardens of the magnificence of those just described. But there are certainly some fine ones such as that of the former Maharaja of Patiala, and the 6.5-hectare (16-acre) Zakir Rose Garden at Chandigarh. Recently the Rose Society of India has laid out a beautiful National Rose Garden at Chanakyapuri (Diplomatic Enclave). It is a definite asset to New Delhi and is visited by large numbers of people during the rose season.

The Rose in India

In India several rose species are found growing wild, mostly in the Himalayan ranges. The cultivation of roses, however, appears to have been taken up much later, though B.S. Bhatcharji thinks that roses were cultivated in India from ancient times, being referred to in old Sanskrit works as 'Taruni Pushpa', 'Atimanjula' and 'Semantika'. The Moguls were known to be ardent admirers of the flower, and the Empress Nur Jehan is credited with the discovery of attar of roses. However, according to the memoirs of the Emperor Jehangir (English translation 1909, 1914), whose consort she was, the credit should actually go to the mother of Nur Jehan, namely, Salima Sultan Begum. Until recently, hardly any rose breeding was done in this country and the latest varieties from Europe and America were imported to beautify our gardens. But the conditions under which

roses are cultivated in temperate countries differ very much from those prevailing in the greater part of India, and it is perhaps only in the hill stations and high valleys that the experience gained abroad can be directly utilized.

Take such an important factor as the time of flowering. A large part of Europe and America is snow-bound in winter. Roses lose their foliage, and various measures are adopted to protect the plants from extremely low temperature which might kill them. The flowering period is mainly in summer, though many modern varieties carry on until autumn. At the time the flowers appear, there is no frost; on the other hand, there may be prolonged moist periods, especially in countries like England. The rose varieties have therefore been bred to suit these conditions. In most parts of India the climate is such that there is no truly dormant period for rose plants, and they attempt to flower throughout the year, in a succession of flushes of bloom. In the western and central plains of northern India, where some of the best roses are grown, summer is very intense and the finest blooms are produced in winter, when there is hardly any rain but night temperatures may be so low as to damage the open blooms, or, in some cases, to prevent them from opening at all.

For those who are interested, a comparison of the relevant meteorological data for Delhi and Greenwich (U.K.) is given below. For Delhi the data relate to December, January, February and March, and for Greenwich to June, July, August and September—the most important months for the flowering of roses.

		Mean Maximum Temperature				Mean Minimum Temperature			
Delhi	(°C.)	23.5	21.2	23.8	30.3	7.8	7.5	9.9	15.2
	(°F.)	74	70	75	86	46	45	50	59
Greenwich	(°C.)	20.6	22.8	22.2	19.4	10.4	12.2	12.2	20.6
	(°F.)	69	73	72	67	51	54	54	69

Roses in the Tropics

In the more tropical parts of India some varieties, especially many of those with shades of orange and yellow, fail to develop their



1. *Rosa brunonii* Lindley (Sp.)

The Musk Rose of the Himalayas (considered to be *R. moschata nepalensis* Lindley by *Modern Roses 8).* This shrubby climber is widespread in the middle-altitude Himalayas. The white flowers in small bunches scent the air around.



2. *Rosa moschata* Herrmann; Musk Rose (Sp.)

Photographed at a regional research station of the National Bureau of Plant Genetic Resources at Simla, this particular material originally came from Nepal, and may be *R. moschata nepalensis* Lindley, which again is probably synonymous with *R. brunonii* Lindley.



3. *Rosa macrophylla*
Lindley (Sp.)
A wide-ranging species in the Himalayas. Flowers pink, produced singly or in clusters. The 'heps' are also attractive.





4. *Rosa webbiana*
Wallich ex Royle (Sp.)
This pink-flowered wild species is found in the western Himalayas. These pictures were taken at Khardung La in Leh.





5. *Rosa sericea*
Lindley (Sp.)
Common in the temperate Himalayas from Kumaon eastward. Flowers white or creamy-yellow. Remarkable as the only four-petalled rose, all others having five or more petals.



6. *Rosa sericea pteracantha* Franchet (Sp.)
This variety of the species is well known for the large, wing-like prickles which are deep red and semi-transparent when young. Photographed at an altitude of 10,500 metres in the Kumaon Himalayas.



7. *Rosa clinophylla* Thory (Sp.)

The wild rose of the tropical tracts of India. Bears white flowers singly or in clusters on a stout, erect or semi-climbing shrub. Distributed throughtout India, especially in the plains of Bengal, near streams and marshy places.

8. *Rosa laevigata* Michaux (Sp.)

Known in India as 'White Mardan', this wild species from China is naturalized in some parts of the country. The five petalled pure-white flowers with golden anthers suddenly appear like a snowfall but last for only about 10 days. The leaves possess only three leaflets but are evergreen and of a refreshing colour.



9. Postage stamps with rose motifs

The beautiful set of four stamps (above) was issued in the United Kingdom to celebrate the centenary of the Royal National Rose Society. The two stamps below were the first depicting roses released in India. They feature the well-known Indian-raised varieties 'Sugandha' and 'Mrinalini'.



full colour. In cities on the coastline, like Calcutta, Bombay and Madras, the combination of a hot humid climate and a strong breeze carrying a salty spray limits the choice of varieties. Here, however, I should like to plead that we should not overstress the disadvantages of our climate. In many areas perhaps we have little to complain if we remember a visitor's description of the English climate as 'nine months winter and three months very bad weather'. This is of course an utter exaggeration, but it is true that there is a good deal of cloudy and dull weather in Britain and some summers are almost literally a wash-out. As far as the northern plains are concerned, the 'rose season' from the end of November to the end of March is sheer heaven. In this period some slow-growing varieties have only two flushes, but some have three, and others even four, the later ones almost telescoping into each other. The garden as a whole reaches its climax of colour in March, when roses, annuals, Bougainvilleas and some flowering trees are all in bloom. This is perhaps also the period when the songs of birds reach a crescendo. But soon, alas! Summer, with long strides, overtakes Spring.

Considering the many differences between the growing and flowering conditions in Europe and America and those in India, it is surprising that we have so few books dealing with the cultivation of roses in this country. In spite of this handicap, many fine roses have been grown. In the regions around Calcutta, the Hybrid Perpetuals held sway at the beginning of this century, being succeeded by the Tea roses such as 'Marie van Houtte' and 'Mrs B.R. Cant'. These in time were soon superseded by the Hybrid Teas, which included such famous names as 'Betty Uprichard', 'Etoile de Hollande', 'Jonkheer J.L. Mock', 'Mme Abel Chatenay', 'Picture' and 'Talisman'. In this connection, I cannot help referring to Mr S. Percy-Lancaster, who was one of the best-known horticulturists in India and who worked for many years as Secretary of the famous Agri-Horticultural Society located at Calcutta. On my writing to him in May 1964, when I was preparing the first edition of my book, about the kinds of roses they used to grow in Calcutta successfully, he sent me the following reply, which I quote verbatim: 'Regarding the roses we grow in Calcutta successfully, I started work in the Agri-Horticultural Society (1902) when we grew ninety-five per cent of Hybrid

Polyanthas. They knew how to grow and flowered after a fashion, but were very hardy. Gradually they had to give way to the hardiest of the Teas such as 'Marie van Houtte' and 'Mrs B.R. Cant'. They finally walked off—or rather were chased off—the stage when Hybrid Teas arrived. You must remember that the climate of Calcutta is not favourable to roses; not only is the climate humid but a high water level keeps the roots of the rose always wet—and this they do not like. We tried a collection from time to time and from all I recollect these did fairly well—'Betty Uprichard', 'Caroline Testout', 'Caledonia', 'Dorothy Page-Roberts', 'Gruss an Teplitz', 'Etoile de Hollande', 'H.G. Glassford', 'Jonkheer J.L. Mock', 'Laurent Carle', 'Lady Helen Maglona', 'Lady Hillingdon', 'Mme Abel Chatenay', 'Marcia Stanhope', 'Picture', 'Rev. F. Page-Roberts', 'Shot Silk', 'Talisman', 'William Shean'. I have had no opportunity of growing these plants to a state of even partial perfection and gave up in disgust after several failures'.

A similar succession of rose classes has been witnessed in several other parts of the country. It is only during the last three decades that interest has suddenly increased in the modern Hybrid Teas and Floribundas. It is hoped that this book, which is based on the experience of an amateur rosarian, will be of interest and value to rose-lovers in this country, no matter whether they grow old or new roses. Besides instructions on growing, selecting and propagating varieties and similar matters, some information of general interest, such as the origin and classification of roses, their early history, the importance of the rose in mythology and in the arts, is also included. This, it is hoped, will make the book of interest not only to those fortunate enough to possess rose gardens but also to those other rose-lovers who have not the means to produce their own roses but would like to know more about their favourite flower.

CHAPTER 2

THE ROSE IN LEGEND, ART AND POETRY

Antiquity of the Rose

How old is the rose? It is certainly much older than man. Fossil remains of the rose found at a site in Colorado, have been estimated by experts to be forty million years old. Some believe the rose is even older. Walter de la Mare has aptly said in his well-known and oft-quoted lines:

> Oh, no man knows
> Through what wild centuries
> Roves back the Rose!

It is not surprising that the rose has figured in the myths and legends, in the poetry and music, of many ancient people. It has been used in rituals, as a motif in architectural decoration, in beautiful designs in jewellery, in pottery and in embroidery.

In Myths and Legends

Many myths and legends show the extent to which the rose had captured the imagination of the ancients. Among the most appealing of these are the ones relating to the colour of the rose. According to one story the rose bloomed in the Garden of Eden; it was white in colour, but when Eve saw it and kissed it, it blushed and thereafter became red. Another legend relates how Rhodanthe, a fair Greek maiden pursued by her ardent lovers, sought refuge in a temple of Artemis, where the Goddess of Purity transformed her into the rose, which however still retained the colour that flushed her beautiful face when confronted with the passionate gaze of her suitors.

In Greek and Roman mythologies the rose is associated with the Goddess of Love and Beauty. In Botticelli's famous painting, 'The Birth of Venus', roses are depicted appearing with Venus as she

rises from the pale-blue sea. If the letters of the word ROSE are rearranged, we derive the name EROS, the God of Love. Indeed, the rose has been associated, perhaps more than any other flower, with love and romance. It is said that the rose would open her petals only to the kiss of her lover, Zephyr. Another story relates that Venus, hurrying through a thicket to keep her tryst with Adonis, trod on a thorn, and that from the drops of blood which oozed from her wounded foot, red roses appeared.

The rose was also sacred to Isis, the ancient Egyptian divinity, and garlands of roses were offered in worship at the altars dedicated to her. In the well-known story of 'The Golden Ass' by Apuleius, the hero, Lucius, as a punishment for his sins, is transformed into an ass. But after numerous adventures and scrapes, he sincerely repented, whereupon Isis revealed to him, in a dream, that in order to regain his human form, he should, on the occasion of her forthcoming festival, munch a handful of roses from among the garlands brought by devotees to her altar. Lucius followed the instructions and was miraculously changed into a man again.

Bassity quotes a charming Hindu legend according to which when Vishnu came down to earth and was bathing in a pool, a lotus blossom opened, out of which stepped Brahma, who, pointing to the lotus, claimed it to be the most beautiful flower on earth. Vishnu, while agreeing it was beautiful, invited Brahma to his own paradise, Vaikunt, where he pointed to a rose bush in a beautiful bower. There was just one flower, pale as the moon with perfume so sweet that Brahma bowed his head and admitted: 'This is the fairest flower that grows'. Rosamond Richardson recalls yet another delightful legend from India according to which 'the most beautiful goddess Lakshmi was born in the heart of a rose that had 108 large and 1,008 small petals'.

'Sub-Rosa'

Very interesting is the story of how the rose became a symbol of secrecy. According to the legend, Eros made a present of the first rose created to the God of Silence, with the implied proviso that the God of Silence should not attempt to reveal any of the amorous secrets of Eros' mother. It is believed that this led to the Greek

convention by which all conversation in a room in which a rose, especially a white rose or a full-blown rose with two buds below it, had been placed was to be regarded as confidential. The term 'sub-rosa'— 'under the rose'—has been derived from this custom.

Popularity in Ancient Rome

The ancient Romans were great admirers of the rose, and it is related that Nero loved them so passionately that he had them everywhere in his palace. The floors were covered with layers of rose petals, which exhaled their lovely perfume when his guests trod on them. Another story discloses that when Cleopatra, the fabulously beautiful queen of Egypt, received Mark Antony in her palace, rose flowers were spread knee-deep on the floors.

In Music and Poetry

In music, Richard Strauss's 'Der Rosenkavalier' is well known, and so is the ballet 'Le Spectre de la Rose', which Nijinsky danced to perfection to Weber's music. And, of course, everyone knows Johann Strauss's delightful waltz, 'Roses of the South'. The rose is also the subject of many favourite songs such as Thomas Moore's 'The Last Rose of Summer'.

Many are the poems that were composed in honour of the beauty and the fragrance of the rose. One of the most superlative tributes is that paid by Sappho, the poetess of Lesbos, born about 600 B.C.

Would Jove appoint some flower to reign,
In matchless beauty on the plain,
The Rose (mankind will all agree),
The Rose the queen of flowers should be;
The pride of plants, the grace of bowers,
The blush of meads, the eye of flowers;
Its beauties charm the gods above,
Its fragrance is the breath of love;
Its foliage wantons in the air,
Luxuriant like the flowing hair;
It shines in blooming splendour gay,

While Zephyrs on its bosom play.

(F. Fawkes's translation)

Another Greek poet Anacreon also asserted that the rose was the queen of the flowers.

In later periods, many poets and writers have written in praise of the rose. According to Peter Coats, Shakespeare uses the rose in more than sixty similes, but most usually to symbolize perfection. Herrick, Leigh Hunt, Blake, Keats and Shelley also wrote in praise of the rose. But it is not only in English poetry that the beauty and the fragrance of the flower is sung. In Persian poetry there are many legends woven round the theme of the love of the nightingale for the rose. Sadi's *Gulistan*, which means Rose Garden, and Nizami's mysterious story based on a rose, are well known.

In Art

One of the earliest-known uses of the rose in art is the decorative motif in the House of Frescoes at Knossos in Crete, which is believed to go back to the middle of the sixteenth century B.C. Curiously, the single flowers have six petals instead of the usual five, but the leaves depicted clearly show that the flower is the rose. Minoan goldsmiths appear to have used the rose flowers and leaves in their designs for jewellery. Highly stylized roses appear in Greek and Roman art, though in many cases it is difficult to be quite sure whether the flower is in fact a rose.

In the illustrations to a fourteenth-century manuscript of the epic poem 'Romaunt de la Rose', the red rose appears. After that there are many examples of the rose in painting and jewellery. Perhaps the most famous rose-painter of all time is Pierre Joseph Redouté, who was commissioned by the Empress Josephine to illustrate flowers. Another equally great artist devoted to the rose was Fantin Latour. The rose illustrations of Alfred Parsons are also noteworthy.

In Heraldry

From the Middle Ages the rose flower has been much used in heraldry. Many of the English sovereigns have employed roses in

their crests or in their crowns. The rose became the national flower of England, and in a later period some of the American States adopted the rose as their emblem.

After a long tussle in the United States between the protagonists of the rose and the marigold as to which of these two should be named as the national flower, a recent report proclaims that the rose has triumphed.

Roses figure prominently in the crests of many famous regiments. It is not surprising that the rose has also found a place in philately; several countries have issued a series of stamps based on the popular flower.

In Modern Times

Even in modern times, several interesting ceremonies are connected with the rose. One of the most unusual is the tradition of the Lancashire Fusiliers for an officer to eat a rose—a Minden rose—at the annual dinner of the Regimental Old Comrades' Association. The custom, said to be more than 200 years old, celebrating a famous victory when men of the Regiment went into battle, each wearing a rose plucked from a garden near which they had been stationed, also requires all new officers to wear a rose at their first Minden Ball.

In India, today, the rose is valued for purposes of worship and for making garlands, without which no function in this country appears to be complete. And in practically all parts of the world it is treasured as a garden flower and as an ingredient of beautiful floral arrangements, not to mention its value in buttonholes, corsages and the like. The first Prime Minister of free India, Jawaharlal Nehru, a much-loved person, always wore a red rose in his buttonhole.

CHAPTER 3

CLASSIFICATION: THE CLASSES OF ROSES

Wild Roses

ACCORDING to the generally accepted classification of Rehder, there are about 120 species of roses. They are extensively distributed in the north temperate and subtropical parts of both the Eastern and the Western hemispheres. They extend from New Mexico to the Arctic Circle in North America: they occur in Abyssinia in the north-east Africa, and are found in the great Himalayan belt of mountains and in the mountains of China and Japan. The species of the rose reported to be growing truly wild in India are the following.

1. *R. brunonii* Lindl.

A strong climbing shrub, stems up to 5 m. (16.5 ft.) high or more, with stout, hooked, scattered prickles, numerous flowers, white, fragrant with musky odour, May–July. Fruit round or ovoid, orange-red or dark brown. Distributed widely in central and western Himalayas up to 3,000 m.

This is the common Musk Rose of the Himalayas. The Musk Roses have the delightful quality of releasing their fragrance to the air where, in the words of Francis Bacon, 'it comes and goes, like the warbling of music'. There has been some confusion in the past regarding *R. brunonii* and *R. moschata*, but G. Krüssmann in his monumental *The Complete Book of Roses* states that while *R. brunonii* is very similar to *R. moschata*, it differs by the narrower leaflets and the smaller flowers in larger corymbs. However, *Modern Roses 8* considers it *R. moschata nepalensis* Lindl.

2. *R. clinophylla* Thory

A stout, erect or semi-climbing shrub. Flowers large, white, borne singly or in clusters. Fruits roundish, hairy. Distribution

throughout India, especially in the plains of Bengal, near streams and marshy places. This is the wild rose of the tropical tracts of India, occurring as bushes in marshes and river banks and in shallow ravines on sandy alluviums. These may in some cases even get submerged in water during the rainy season, only the fruiting branches being visible above the water level.

G. Panigrahi of the Botanical Survey of India (personal communication) differentiates this species into three botanical varieties of which two are endemic to the Indian subcontinent, while the third spreads further eastward.

The species has attracted the attention of rose experts—for instance, E.F. Allen in 1977—as a possible starting point, along with garden varieties like the Noisette Climber 'Lamarque', for a programme of breeding rose varieties adapted to tropical conditions. Since the genetic and ecotypic variation in *R. clinophylla* is hardly known, it would be prudent to use for this purpose only plants actually collected from typically tropical areas.

3. *R. eglanteria* Linn.; Sweet Briar, Eglantine

A small bush with abundant foliage. Flowers pink, 1-3 on each stalk. Fruits roundish, orange-red to scarlet. Common in the northwest Himalayan region of Gilgit, Kashmir and western Tibet. Sometimes grown as a hedge plant.

4. *R. foetida* Herrm.

An erect bush of medium height with a few straight spines. The heavily odorous rich-yellow flowers are borne singly or in few-flowered groups. Hips rich in Vitamin C. Also known under names like Austrian Briar, it is one of the important ancestral species of garden roses. The form that was used in the remarkable cross by Pernet-Ducher was of course not the Indian one.

5. *R. gigantea* Collett

A rampant climber ascending up to 15 m. (50 ft.) with strong, hooked, scattered prickles, large flowers mostly solitary, 12.5 crn. (5 in.) across, white to light yellow, scented. Fruits large, globular or shortly pear-shaped, yellow or orange.

Attains its greatest luxuriance in north Burma but extends to south-west China, and in the other direction to north-east India up to Sikkim. Common in Manipur, where it is known as the Manipur Wild Tea Rose. Graham Stuart Thomas, the world authority on old roses, refers to it as 'the great limp-petalled, *R. gigantea*, the creamy-yellow prototype of the Tea Roses', thereby recalling its important role in the ancestry of present-day garden roses.

6. *R. leschenaultiana* Wight & Arnott

A profuse climber, with purplish branches bearing small hooked prickles. Flowers large, pink, fragrant, borne in small clusters. Fruits roundish, red and rough. A common rose confined to the Western Ghats, Nilgiri Hills and Palni Hills, at altitudes of about 1,000 m. (3,280 ft.).

7. *R. longicuspis* Bertol.

A strong, sparsely prickly, evergreen climber, producing white fragrant flowers in clusters. The deep-red or orange fruits are globose. Distributed in the Khasia and Mishmi Hills, can be found up to 3,000 m.

8. *R. macrophylla* Lindl.

An erect, deciduous shrub up to 4.5 m. (15 ft.) in height and as much across and one of the most beautiful of the Himalayan wild roses. Flowers clear warm pink and sweet-scented. Graham Stuart Thomas remarks, 'Few roses have such an elegant poise of bloom'. Fruits are large, flask-shaped, red when ripe, and are said to be eaten. It has been remarked that the plant is handsome both in flower and fruit.

Found over a wide range in the temperate Himalayas.

9. *R. moschata* Herrm.

A shrub with 3–4-m.-long (10–13-ft.-long) arching branches. Flowers white, mostly three together, in large terminal clusters, strongly scented. As already mentioned, this species is very similar to *R. brunonii*. Krüssmann gives the flowering seasons as June–July for *R. brunonii* and August onwards till the setting in of frost for *R. moschata*. He states that autumn flowering is a specific character

important for the breeding of new roses. As is well known, *R. moschata* has been one of the important ancestral species contributing to the evolution of garden roses.

There has been some confusion in the past whether this species occurs in the Indian Himalayas in addition to *R. brunonii*. I have gone along with the view of the Botanical Survey of India, and included it in my list.

10. *R. sericea* Lindl.

An erect shrub with a very spiny stem. Flowers creamy yellow, fragrant, solitary, with four (rarely five) petals. It is unusual in being the only four-petalled rose. It is also notable for the large, dilated, often flattened prickles. In *R. sericea* var. *pteracantha* they are particularly large, wing-shaped, decurrent, shining and translucent red when young. According to Kingdon Ward, who is referring to this species as found in north-eastern India, the rose hips are crisp and deliciously sweet.

11. *R. webbiana* Wallich ex Royle

A medium-sized erect shrub, producing pink flowers singly or in small groups. Fruits pale red, flask-shaped. Distributed in the arid inner Himalayas at altitudes of 3,000–4,000 m. (9,840–15,420 ft.). Common in Ladakh. Fruits are rich in Vitamin C and edible.

In addition to the above, the following species are reported to have become naturalized in some hilly areas of northern India: *R. banksiae*, *R. laevigata* and *R. multiflora*. The double white and double yellow forms of the first named are also grown as climbers in a few gardens, as also *R. laevigata* under the name of 'White Mardan'. *R. multiflora* is extensively used in some parts of the country as an understock for budding garden roses. *R. ecae*, the Afghan Rose, is reported to be used as a hedge plant in Kargil (Ladakh). Some of the wild and naturalized species found in India are magnificent, but have only been seen in their full flowering beauty by people who are able to go high up into the mountains. Surely, the aristocrat among the wild species is *Rosa gigantea*, which according to the well-known authority on old roses, Nancy Steen, 'has a spread of over sixty feet and flowers measuring six inches in diameter'. The fruits have been reported to be of the size of small apples and come into the bazaars

in a couple of the north-eastern states, as they are relished by the local inhabitants. However, it is Kingdon Ward's encounter with *R. gigantea*, whilst he was plant-hunting in Manipur, which is most memorable. He wrote: 'One of the most amazing sights was a huge scrambling rose, which sprawled determinedly over the trees in every lane and copse. The largest specimen we saw had what I can only describe as a trunk, as thick as a man's forearm, from which sprang several stems, each more than a hundred feet long and all heavily armed with strong flat prickles'. After the stems pierced the top of the forest canopy, Kingdon Ward observes, 'Now that it had come through the roof into the open, it greeted the sunshine by hanging out banners of flowers on every side. The chubby leaves, still soft and limp, were a deep red; the slim, pointed flower-buds a pale daffodil-yellow; but when the enormous flowers opened, they were ivory-white, borne singly all along the arching sprays, each petal faintly engraved with a network of veins like a watermark. The shock of orange-capped stamens made a perfect centre-piece, and the flower distilled a delicate fragrance. What a sight was this great dog rose throughout March, lording it over the thickets, festooning the tallest trees, and hanging from every limb in cascade of scented flowers the size of tea cups....The globose hips look like crab apples. They are yellow with rosy cheeks when ripe...'.

Fruits of some other species, though not as imposing in size, have been recorded as being edible. In descriptions of wild species reported from temperate countries, mention is made of the fact that apart from the flowers, some of the climbing and shrub forms of roses provide an extra bonanza in the shape of fruits which follow the flowers and can be not only beautiful in shape as in *R. moyesii*, but also brilliant in colour. Usually, no mention is made in books from these countries about the rose fruits being edible, although the use of some of them for preparing jams and jellies, rich in Vitamin C, has been well known. In India there is the additional useful attribute of the fruits of a few species being consumed by inhabitants of difficult mountainous areas.

Cultivated Roses

As far as the garden roses of the world are concerned, only eight

species have played an important ancestral role, though seven or eight more have also been concerned in a very minor way. The important species have been the following: *Rosa chinensis*, *R. damascena*, *R. foetida*, *R. gallica*, *R. gigantea*, *R. moschata*, *R. multiflora* and *R. wichuraiana*.

Cultivated roses can be conveniently dealt with under two groups: those in cultivation before 1800, and those after. In the earlier period, all the European garden roses could be placed in the section Gallicanae, all being descended from the so-called French rose, *Rosa gallica*. The Damask rose, *R. damascena*, is closely allied to it and included two groups, one of which flowered only in summer while the other group gave, in addition, a smaller crop of flowers in autumn and was valued on this account. It has been suggested that the second group was the result of crossing of *R. gallica* with *R. moschata*, the Musk rose, or another species of this group.

Introductions from the East

The period after 1800 was notable because of the influence of perpetually flowering forms derived from *R. chinensis* and *R. gigantea* from the Far East. Crossing with the new introductions gave rise to the important groups of the Noisettes and the Bourbons. Further complex crossing ultimately gave rise to the great groups of the Tea roses and the Hybrid Perpetuals, which dominated gardens in many parts of the world in the second half of the last century and even the early part of the present one. The Tea roses were prized for their continuous flowering habit, while many of the Hybrid Perpetuals included varieties of magnificent size and rich perfume. While the Teas were tender and needed protection in winter in the colder regions, the Hybrid Perpetuals were much more hardy.

Origin of the Hybrid Teas

An outstanding event in the rose world was the origin of the Hybrid Tea roses. In these, attempts were made to combine the virtues of the Teas and the Hybrid Perpetuals. The first Hybrid Tea rose is usually considered to be 'La France', raised by the French rose breeder Guillot, and introduced in 1867. This large-flowered silvery-pink rose with delicious fragrance was grown in India until very recently—for instance in Bengal, Bihar and Bangalore. Gradually,

the Hybrid Teas gained importance, and by the early years of this century these became the garden roses *par excellence*. It is said that if the rose is the queen of the flowers, the Hybrid Tea is the queen of the roses.

The range of colours in the roses was limited for a long time to white, pink, red, deep crimson and purple. An important breakthrough was achieved when, at the beginning of the twentieth century, Pernet-Ducher, using the species *Rosa foetida* in his breeding programme, produced the first yellow Hybrid Tea, 'Soleil d'Or'. The varieties produced from 'Soleil d'Or' and other hybrids with *R. foetida bicolor* were called the Pernetianas and were distinguished by brilliant yellow or orange colour, but were lacking in fragrance and were rather susceptible to the Black Spot disease. Later breeding work has corrected these faults to a considerable degree, and in view of the complex pedigrees of the present-day forms, the term Pernetiana has fallen into disuse.

The Rise of the Polyanthas

A distinct group of roses, known as the Polyantha Pompons or Dwarf Polyanthas, developed parallel to the Hybrid Teas. The name 'Polyantha' appears to have come into use because of the ultimate origin of the group from the species *Rosa polyantha*; this species, however, is now called *R. multiflora*. From some seeds of this climbing species, sent from Japan to France, were raised a number of climbers, but in a further generation some dwarf perpetually flowering forms were also discovered. This was the origin of the Polyanthas. It is suspected that they were the result of a cross between *R. multiflora* and a variety called 'Dwarf Pink China'.

The Polyanthas are valuable garden plants because they bloom for months and months, providing a continuous spectacle of colour. In cold climates their hardiness is another advantage. However, after 1936, rose breeders lost interest in them and began to concentrate on the new class, the Hybrid Polyanthas, now called Floribundas. A very recent development is the great interest in Miniatures, and several hundred varieties have been bred in the last few years.

The Modern Floribundas

In 1910 the Danish rose breeder Poulsen initiated a programme

of hybridization between the Dwarf Polyantha roses and the Hybrid Teas. 'Rödhätte', introduced in 1912, was the first of these hybrids, but the new class really made an impression in 1924, when 'Else Poulsen' (still grown in India today) and 'Kirsten Poulsen' were released. As already stated, the new group was described as the Hybrid Polyantha but in due course it was replaced by the term Floribunda, at least as far as Rose Shows and the general public are concerned. In recent years there has been a remarkable development of the Floribunda roses, and in some parts of the world they are now considered to be as important as the Hybrid Teas. The chief reason for their popularity appears to be their capacity for producing large quantities of blooms, much more than the Hybrid Teas, and with often better-shaped blooms than the Dwarf Polyanthas. For the smaller gardens that are typical of the modern age, they solve to some extent the problem of producing large quantities of good-quality blooms in a limited amount of space.

Of late, another name, the Grandiflora, has been sought to be introduced for varieties produced by crossing the Floribundas with the Hybrid Teas. However, this term, which is in vogue in America, has not been accepted in the United Kingdom and some other countries because, first, this nomenclature offends the International Rules of Nomenclature of Plants, and, secondly, it is difficult to differentiate between the so-called Grandifloras and some of the existing vigorous Hybrid Teas. The main attribute said to be characteristic of the Grandifloras, i.e. large flowers in small clusters with very vigorous growth, is surely found in the Hybrid Teas like 'Elite' and 'Una Wallace'. There have also been attempts to introduce classes like 'Flora Teas', but without success.

It will be convenient to enumerate the main classes of garden roses and indicate briefly their principal characteristics.

MAIN CLASSES OF GARDEN ROSES

The Hybrid Teas

These are the large-flowered types very common and most valued in this country. The origin of this class, as already stated, was the crossing of the Hybrid Perpetual and the Tea roses. Later they

were crossed among themselves, and also with some other types such as the 'Pernetianas', with the result that the present-day Hybrid Teas are quite a complex group. 'Crimson Glory', 'Paradise', 'Peace' and 'Super Star' are some well-known examples.

Some of the Hybrid Teas have 'sported' to produce climbing forms, which are identical with the parent varieties except for the climbing habit, e.g. 'Climbing Crimson Glory', 'Climbing Peace', and the very recent 'Climbing First Prize'.

The Hybrid Perpetuals

Obtained by crossing the then existing roses in Europe such as the Damasks and the Gallicas with the perpetually flowering introductions from China, the Hybrid Perpetuals are characterized by tall growth, large full flowers, and, in many cases, by rich fragrance. The name is, however, a misnomer as they are certainly not perpetually flowering, although an improvement on the earlier types that bloomed only once a year. Examples of this class are 'Général Jacqueminot', 'Mrs John Laing' and 'Paul Neyron'.

The Teas

This group was valued for its freedom of flowering at a time when most roses in Europe gave only one, though magnificent, flush of bloom. They are characterized by a distinct fragrance said to be reminiscent of the aroma released when a chest of tea leaves is opened. The Tea roses are not as hardy and resistant to cold as the Hybrid Perpetuals. Some much-loved Tea roses grown in this country till recently are 'Lady Hillingdon', 'Molly Sharman-Crawford' and 'Mme Falcot'. It is interesting to note that the last-named rose dates back to 1858!

The Floribundas

The Floribundas started with a group called the Hybrid Polyanthas, created by crossing the Hybrid Teas with the Dwarf Polyanthas. Later on the hybridization became more involved, and the class is usually called the Floribunda. To some extent they combine the form of the Hybrid Tea with the perpetually flowering propensity of the Polyantha. While only a very few of the earlier Floribundas were scented, the number of well-scented members of this group has

increased and some like 'Elizabeth of Glamis' are valued for their fragrance, apart from their other attributes.

The Dwarf Polyanthas

The origin of the Dwarf Polyanthas has already been described earlier. They produce enormous clusters of small flowers, and bloom for several months. There are valuable roses in this group, including 'Baby Faurax', 'Cameo', 'Cécile Brunner', 'Chatillon Rose', 'Echo' and 'Yvonne Rabier'. In Delhi and possibly some other regions, 'Chatillon Rose' and 'Echo' are still highly valued.

The China Roses

Also called Bengal or Monthly roses, this group includes perpetually flowering types such as 'Common Blush China', 'Comtesse du Cayla', 'Cramoisi Supérieur' and 'Mme Eugène Résal', suitable for hedges and borders. The curious, so-called Green Rose belongs to this class.

The Miniatures

The Miniatures are the very popular roses, once called Baby Roses, with small leaves and small exquisite flowers. If grown from cuttings, the growth also remains small. They are lovely subjects for growing in pots or for use as edgings. Examples are: 'Baby Masquerade', 'Coralin', 'Cup Cake', 'Little Flirt', 'Magic Carrousel', 'Over the Rainbow', 'Party Girl', 'Pixie', 'Puppy Love', 'Red Imp', 'Rosmarin' and 'Starina'. It should be mentioned here that as a result of hybridization between the Miniatures and Floribundas, a whole range of a new type which the well-known writer Sean McCann calls 'the inbetween roses'—referred to by some as Patio, Sweetheart, Meillandina, Minimo and so on—are being produced in large numbers and may become very popular in the near future.

The Damask Roses

This group was so named because it is believed that these roses were brought by the Crusaders to Europe from Damascus. Some of the most richly scented roses belong here and are used for the manufacture of otto of roses. Some well-known varieties are 'Celsiana', 'Kazanlik' and 'Mme Hardy'.

The Bourbon Roses

The Bourbon roses arose, at the end of the eighteenth century, in the island of Reunion (formerly Isle Bourbon), in the Indian Ocean, as a result of a natural cross between the Damask and China roses. They have some of the most gloriously scented roses, including the well-known 'Rose Edouard', grown in India. Other examples include 'Boule de Neige', 'Honorine de Brabant', 'Louise Odier' and 'Souv. de la Malmaison'.

The Cabbage Roses

Belonging to the species *Rosa centifolia*, these were very popular in England in the days bygone. The flowers were full and globular and strongly scented. Examples are 'Robert le Diable' and 'Tour de Malakoff'.

The Moss Roses

The Moss roses arose as a mutation or sport from the Cabbage roses, and are characterized by a sweetly scented moss-like growth of glandular hairs, especially on the sepals. Popular varieties include 'Célina', 'Nuits de Young' and 'Old Pink Moss'.

The French Roses

Also called the Gallicas, these were some of the most important garden roses until the Hybrid Perpetuals appeared, to be followed by the Hybrid Teas and the Floribundas. It is said that the Gallica roses were grown in temple gardens by the Persians as long ago as 1200 B.C. At one time they were in demand for medicinal purposes. The group is characterized by large blooms of varied colours and exquisite fragrance. In Europe, however, they bloom only once in a year. Some well-known varieties are 'Alain Blanchard', 'Belle de Crécy', 'Cardinal de Richelieu', 'Rosa Mundi', and 'Variegata di Bologna'. *Modern Roses 8* considers the last variety as a Bourbon rose.

The Albas

Another old group much prized in the past, the Albas make good shrubs with pale sweetly scented flowers, e.g. 'Great Maiden's Blush' and 'Queen of Denmark'.

The Musk Roses

This group includes varieties suitable for growing as Shrub roses or in a few cases as Pillar roses. The flowers come in clusters and some have a pronounced musky fragrance, which is carried by the breeze. Some well-known hybrid Musks are 'Felicia', 'Pax', 'Penelope', 'Prosperity' and 'Vanity'.

The Noisette Roses

The Noisette roses are considered to be hybrids between the Musk and China roses. The group is well known for providing some of the best climbers including 'Mme Alfred Carrière', 'Maréchal Niel' and 'Lamarque'.

The Rugosas

Sometimes called the Japanese roses, the Rugosas are extremely vigorous, resistant to cold and able to grow in poor soils along the seashore. They make good shrubs and hedges, especially as they are very thorny. Important examples from this group are 'Blanc Double de Coubert', 'Frau Dagmar Hartopp' (also called 'Fru Dagmar Hastrup'), 'Roseraie de l'Haÿ', and 'Pink Grootendorst'.

The Scots Briars

The Scots Briars, also called the Burnet roses, belong to the species *R. spinosissima*. They have been used in crossing to provide some very useful modern Shrub roses. Among the older varieties, *R. spinosissima altaica* is considered one of the best.

Modern Shrubs

These are the results of so much cross-breeding that they cannot be classified with any of the preceding groups. This group includes such beauties as 'Fritz Nobis', 'Frühlingsgold', 'Frühlingsmorgen', 'Sparrieshoop' and 'Skyrocket' ('Wilhelm').

Rose Species

Some rose species have already been referred to. There are many other examples, including *Rosa pteragonis* var. *cantabrigiensis*, *R. hugonis*, *R. macrantha* cultivar 'Lady Curzon', *R. moyesii*, *R. rubrifolia* and *R. soulieana*, which make fine shrubs.

The Austrian Briars

These belong to *Rosa foetida* (sometimes also called *R. lutea*). Some of this small group have exercised a great influence on modern roses. 'Austrian Copper', with petals of brilliant coppery orange on the upper side and yellow on the lower side, is the progenitor of the bicoloured roses. 'Austrian Yellow' and 'Persian Yellow' are also well known.

The Wichuraiana Ramblers

These are the true Ramblers, derived from *R. wichuraiana*, a wild species from Japan. Naturally of a trailing habit, they can be trained on a trellis and on low walls. There are some beautiful ramblers in this group, outstanding among them being 'Albéric Barbier', 'Albertine', 'Dorothy Perkins' and 'Excelsa'.

While some Climbing roses have been referred to under their respective groups, there are many derived from various sources, which have not been included. Mention of these will be made in the chapter on Ramblers and Climbers.

Ground-Cover Roses

In recent years, in temperate countries there has arisen the use of certain roses as ground-covers. Some think that these should really be called procumbent roses. Varieties with long stems that creep or trail are suitable for this purpose, as also Climbing Miniatures like the delightful 'Nozomi' from Japan. Under Indian conditions, however, there does not appear to be much scope for the utilization of ground-cover roses.

CLASSIFICATION FOR SHOW PURPOSES

A proper classification of roses is difficult and is a matter for specialists. For purposes of Rose Shows, therefore, a simple grouping is followed, which is explained in the chapter, How to Exhibit Roses. However, this grouping is very artificial and results in many anomalies. For instance, the five-petalled variety 'Dainty Bess' is classified as a Hybrid Tea, whereas the large many-petalled 'Queen Elizabeth' is termed a Floribunda! In order to try and rationalize



10. 'Poornima' (H.T.)

I have seen the dew-drop clinging
To the rose just nearly born

– Charles Jeffreys

Very long light-yellow buds open out to large, fully double blooms of rich butter-yellow. Fragrant. Useful both for bedding and exhibition.



11. 'Michèle Meilland' (H.T.)

Delicate translucent pink buds open out to large flowers of remarkable beauty. In warm weather there is sometimes a shading of amber or light apricot. A very desirable rose.



12. 'Priyadarshini' (H.T.)

A delightful blend of pink and white. Exquisitely shaped flowers are produced by a bush of medium height.



13. 'Century Two' (H.T.)

The large well-formed flowers, carried on a tall vigorous plant, have made this American variety popular both as a garden rose and an exhibition variety.



14. 'Indian Princess' (H.T.)

From hybridization between 'Super Star' and 'Granada' has come this outstanding Indian variety. The plant growth is like that of 'Super Star' but its colour is its own – the outer petals are light red, the inner ones are carmine with a silvery edge. Well scented.



15. 'Eiko' (H.T.)

Pointed buds open out to shapely, large yellow-and-scarlet flowers, slightly fragrant. Vigorous bush with glossy light-green foliage.



16. 'Golden Giant' (H.T.)

A well-named rose with large, double well-formed flowers, the colour of which in a climate like Delhi's may vary from a light yellow to rich golden yellow. Very tall and vigorous with large handsome foliage.



17. 'Abhisarika' (H.T.)

Raised from a cross between an induced mutant and 'Kiss of Fire', the small to medium-sized flower is notable for the remarkable colour variations which give it a "hand-painted" look. A striking Indian variety.

matters and bring about a logical grouping of varieties, the American Rose Society set up an expert committee to go into the matter of rose classification. In the United Kingdom also the Royal National Rose Society has made a similar endeavour. The new classifications proposed are based on a digital system which classifies roses into types according to plant and flower characteristics. These were discussed by a special study session at the Fourth International Rose Conference held in 1968 in London. The proposals, however, were received with mixed feelings. While some rose experts welcomed the new proposals as bringing order into a rather chaotic state of affairs, others strongly disagreed, and one delegate stated: 'We do not want a telephone directory. What we want is something plain, simple and easy to look after. We do not want figures and figures and more figures'.

It appears that finally there is a consensus that for show purposes roses may be classified into the following categories:

(i) Large-flowered
(ii) Cluster-flowered
(iii) Miniatures
(iv) Shrubs
(v) Climbers

Such a classification certainly makes things much simpler, but it will take time for people to become reconciled completely to this new system. For some time to come it is likely, as is happening to a large extent today, that after 'Large-flowered', 'H.T.' will appear within brackets, and similarly after 'Cluster-flowered', 'Floribundas' will appear in brackets. And as already adumbrated, there may be a new additional class to be accommodated—'the Inbetweens'.

CHAPTER 4

PLANNING THE ROSE GARDEN

A ROSE plant is beautiful no matter where it grows. But when a number of plants are grown, some attention to design is important for obtaining the maximum effect. The best rose garden in one where the rose plants, whether planted singly or in groups, blend naturally into the landscape to form a living part of it, or where it helps to bring out and enhance the architectural features of a house.

As someone put it, in landscape gardens there has been a shift nowadays from gardens-to-look-at to gardens-to-live-in. The skilful architecture of today contrives so cunningly that the garden becomes an extension of the living-room. Many people now prefer a carefully designed informal garden to the extremely formal types that were the vogue in the past. However, formal rose gardens still have their special uses, such as a setting for palatial buildings, and can be exceedingly decorative and beautiful. Also, formal and informal gardens are not mutually exclusive, and if the area is large enough, both types can be judiciously introduced into the master plan.

Planting Requirements

At the time of designing a rose garden, certain important considerations should be kept in mind.

1. Roses like plenty of sunlight. They should therefore be planted where they will get sun for at least half the day, preferably the first. A little shade towards the later part of the afternoon is actually helpful in hot climates.

2. Close proximity of trees and buildings is generally harmful because they can cast heavy shade; in the case of trees their roots will compete with rose roots for the nutrients in the soil. But the Floribunda roses can be most effective as 'foundation' plantings, provided they receive sufficient sun.

3. If there is too much shade, roses are more susceptible to diseases such as Mildew. Also, though the plants may grow tall and lanky, the quality of the flowers will be poorer.

4. Roses do not like 'wet feet'; hence drainage must be good so that even after a heavy shower water does not remain standing around the plants for a long time.

5. Roses are likely to be damaged by strong winds. Hence a part of the garden which is protected from direct gusts of wind, either by a building, a wall, or a natural wind-break of trees or hedges, is most suitable. Fresh air is, however, necessary, and roses are not likely to thrive in a small yard cloistered by high walls.

6. It is best to grow roses separately from other kinds of plants. Harry Wheatcroft says: 'Let the queen reign without attendants.' But some of the Floribundas and Polyanthas can be used in the foreground of shrubberies, while pansies and violas create a lovely effect under Standards.

7. A little space should be kept in reserve for expansion because there must always be room for another rose. When the new catalogues arrive, there is the urge to try one or more of the latest beauties.

Keeping in mind what has been said above, consideration should be given for the view the rose garden would present from the windows of the home. There is a season of the year when the rose bushes do not look their best. In temperate countries and in our hill stations this period is winter, when the leaves will be shed, leaving the bare stems with prickles. In the plains of India, however, the 'dog days' for the roses are between the end of March and the beginning of July, when temperatures are high and hot dusty winds blow. But there are differences among varieties, and some like the Floribunda 'Iceberg' manage to keep themselves adequately clothed in foliage throughout the year.

Designs

While single plants can be used with great effect—such as the rich-red climber 'Don Juan' against a white wall, or the brilliant-yellow 'Royal Gold' against a warm-grey one, or again a strategically placed Weeping Standard of *Rosa banksiae* in a quiet corner—most

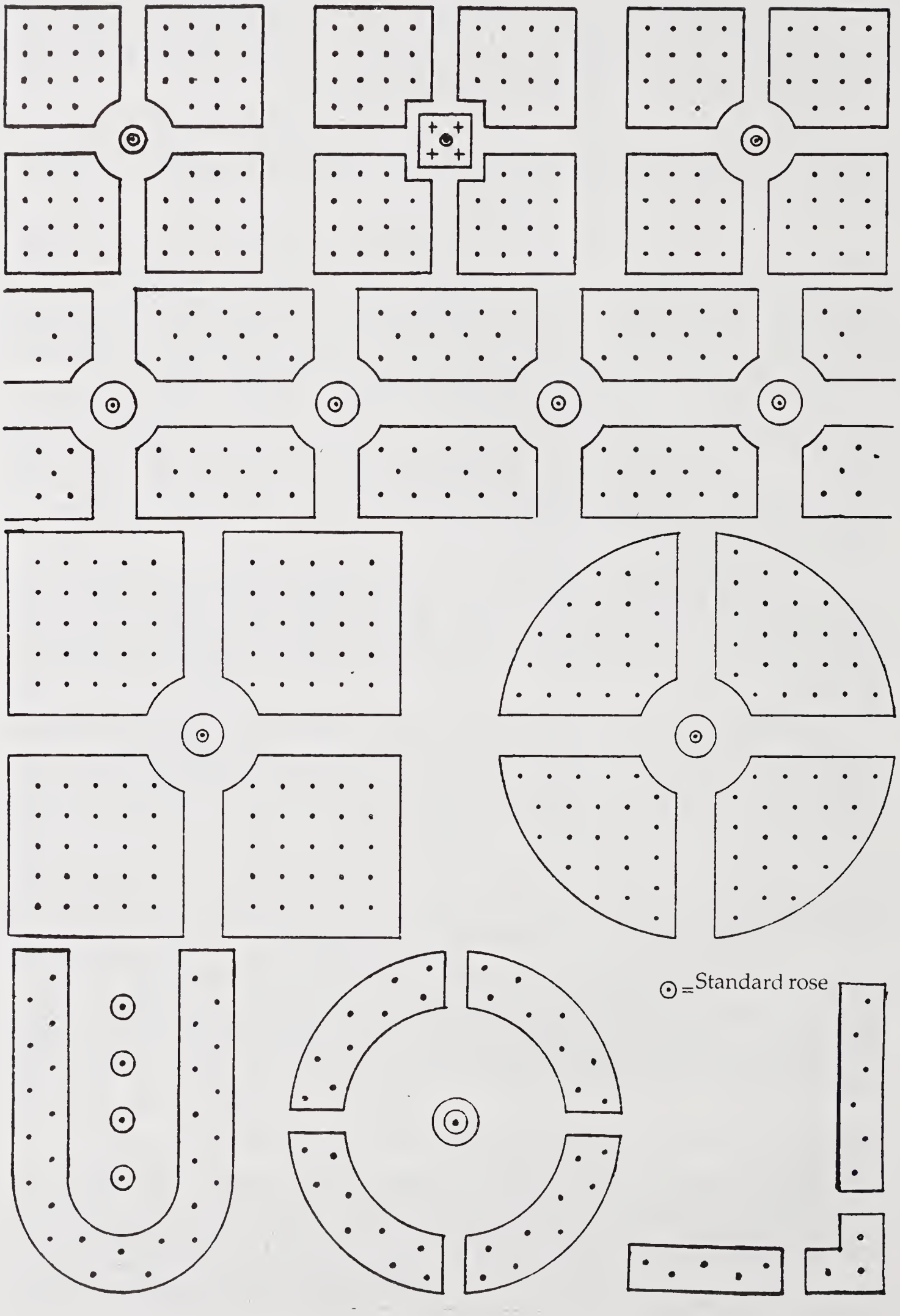


FIG. 1. Formal designs for planting roses

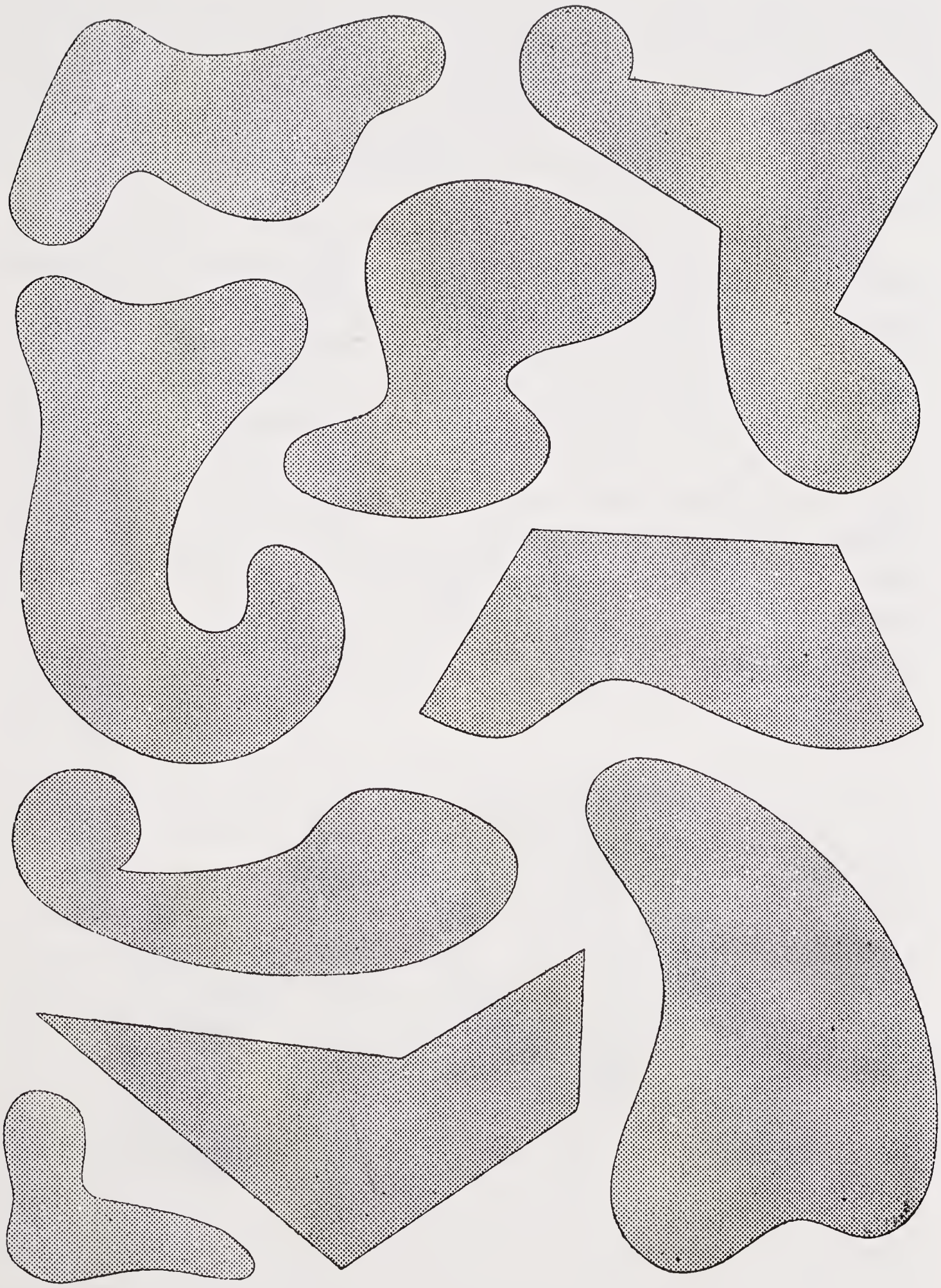
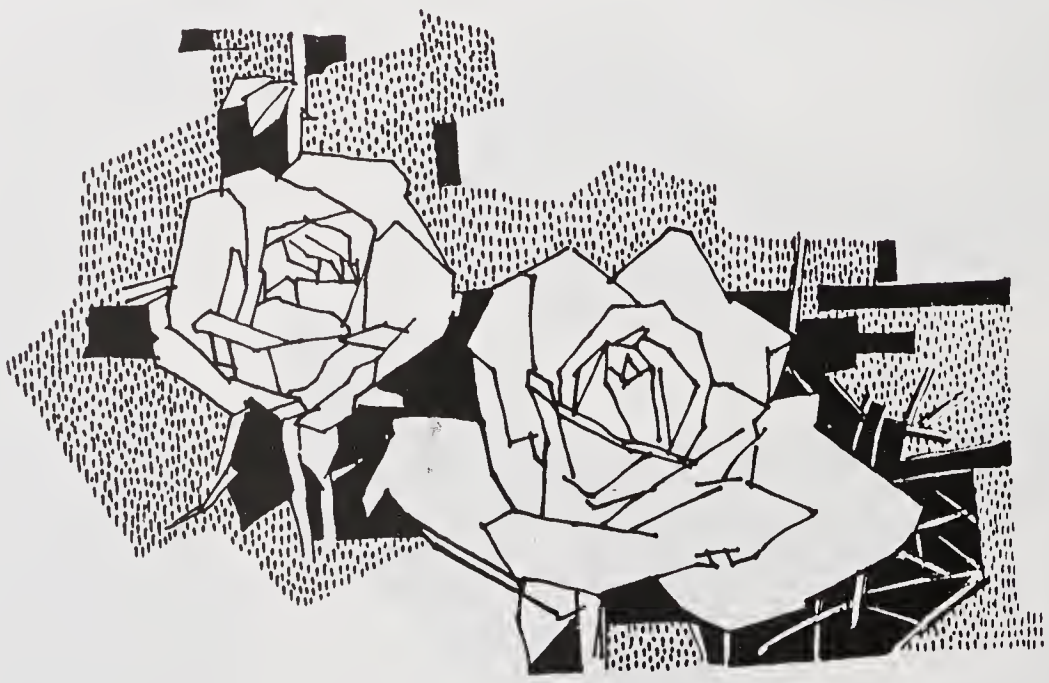


FIG. 2. Informal designs for planting roses

roses are best used in groups in beds. A tremendous variety of shapes and sizes is possible, and there is opportunity for everyone to exercise personal predilections in choosing the lay-outs. So there need be no hesitation in taking up a pencil and trying out ideas on paper first. Also it is better to visit other rose gardens and make mental notes on their pleasing features.

One thing to remember is that the arrangement of the plants in a bed should not only look nice but it should also facilitate garden operations like hoeing and weeding. The Hybrid Teas should be planted at a distance of 75 cm. ($2^1/_2$ ft.) between plants, while for the Floribundas, which are used for massing, the intervening distance may be 60 cm. (2 ft.). However, this will depend upon the individual varieties to be grown, for some are more vigorous than others and require more space. Also, if the soil is fertilized heavily, the growth will naturally be much larger than with ordinary manuring. On the preceding pages are given some designs to choose from as well as to stimulate thinking out of some more.



CHAPTER 5

HOW TO SELECT VARIETIES

THE rose is a versatile plant, and the fantastically large number of types available is one of the reasons for its great popularity. There are roses suitable for use in beds, in hedges, or as borders or edgings; other suitable for covering walls or training on arches, pillars and pergolas; or, again, for growing as Standards. There are wee little Miniature roses at one end of the scale, while at the other some have blooms 20 cm. (8 in.) across. One may choose them for their lovely shape, for their range of colour and for their unforgettable fragrance. John F. Lemon has said: 'There are almost as many possible reasons for liking or disliking a variety, buying it or not buying it, as there are people. If we all coveted the same rose, or the same woman, wouldn't the world be in an awful fix? I will pick my wife—and rose; you pick yours.'

The number of rose varieties is legion. According to J.A. Gamble more than 16,000 improved rose varieties have been recorded since 1800. After this statement was made by Gamble, the number of new rose varieties has no doubt gone up very much more. In recent years, a very large number of rose varieties have been bred every year in different countries of the world, while, of course, a certain number of the older varieties have been lost. The problem, therefore, is selection. First of all, one should be very clear about the 'types' required. The earlier chapters have indicated the characteristics of the various kinds of roses. From the information given one can decide whether one needs the Hybrid Teas, Floribundas, Dwarf Polyanthas, Shrub roses or Climbers. A plan or lay-out for the garden should be made on paper, and the number of each type needed may be calculated. After this is done, it is just a question of picking out the particular varieties from what is available for sale in the nurseries. Detailed descriptions of a large number of varieties are

given at the end of the book.

In some types of roses, the number of varieties is simply bewildering. In the Hybrid Teas, for instance, some nurseries list hundreds of varieties. Since the descriptions indicate often the best points rather than any weaknesses, it is extremely difficult to make a choice. Others catalogue a relatively small number of tried and tested varieties—a boon to the newcomer to rosedom; but it naturally limits the selection severely. The best way is to visit a large nursery or a public garden which has an authentically named collection of roses, and inspect the plants when they are in flower. More than one visit is desirable, as this enables one to find out the performance of the varieties at different times of the year, in noticing which are the tall and which the dwarf ones, which have the most attractive foliage, and which are more resistant to diseases and pests. Above all, one will be able to perceive the colour of the rose flowers—which is liable to change from season to season and varies with variations in the climate. And, surely, without seeing the blooms how can anyone imagine the differences in shade or tint between rose-pink, dawn-pink, blush-pink, salmon-pink, coral-pink and orchid-pink to mention only a few of the colour-descriptive terms? Even the same bloom undergoes a series of fascinating changes in its development from a modest bud to the full-blown flower. No book or catalogue can possibly detail all this; moreover the descriptions based on plants given in one region may be completely misleading elsewhere.

Performance of the International Award-Winners

Though the award of an important international trophy to a rose variety certainly indicates its worth under the conditions where it was grown and tested, it does not provide a reliable clue to how it will fare under different conditions elsewhere. For instance the title 'All-America Rose Selection' (AARS) is given to one or more varieties in a year, on the results of a two-year trial under actual garden conditions, at 24 centres spread throughout the United States. The list of the AARS winners from 1950 onwards is given below.

1950	'Capistrano' H.T.	'Mission Bells' H.T.
	'Fashion' Fl.	'Sutter's Gold' H.T.

1951 No award was made

1952 'Fred Howard' H.T.
'Helen Traubel' H.T.
'Vogue' Fl.

1953 'Chrysler Imperial' H.T.
'Ma Perkins' Fl.

1954 'Lilibet' Fl.
'Mojave' H.T.

1955 'Jiminy Cricket' Fl.
'Queen Elizabeth' Fl.
(In America classed as a Grandiflora)
'Tiffany' H.T.

1956 'Circus' Fl.

1957 'Golden Showers' Climber
'White Bouquet' Fl.

1958 'Fusilier' Fl.
'Gold Cup' Fl.
'White Knight' H.T.
(This rose is called 'Message' in most countries)

1959 'Ivory Fashion' Fl.
'Starfire' Fl.
(In America classed as a Grandiflora)

1960 'Fire King' Fl.
'Garden Party' H.T.
'Sarabande' Fl.

1961 'Duet' H.T.
'Pink Parfait' Fl.
(In America classed as a Grandiflora)

1962 'Christian Dior' H.T.
'Golden Slippers' Fl.
'John S. Armstrong' H.T.
(In America classed as a Grandiflora)
'King's Ransom' H.T.

1963 'Royal Highness' H.T.
'Tropicana' H.T.
(This rose is called 'Super Star' in most countries)

1964 'Granada' H.T.
'Saratoga' Fl.

1965 'Camelot' H.T.
(In America classed as a Grandiflora)
'Mister Lincoln' H.T.

1966 'American Heritage' H.T.
'Matterhorn' H.T.
'Apricot Nectar' H.T.

1967 'Bewitched' H.T.
'Lucky Lady' H.T.
(In America classed as a Grandiflora)
'Gay Princess' Fl.
'Roman Holiday' Fl.

1968 'Europeana' Fl.
'Maria Callas' H.T.
'Scarlet Knight' H.T.
(This rose is called 'Samourai' in most countries. In America classed as a Grandiflora)

1969 'Angel Face' Fl.
'Comanche' H.T.

(In America classed as a Grandiflora)
'Gene Boerner' Fl.
'Pascali' H.T.

1970 'First Prize' H.T.

1971 'Aquarius' H.T.
'Command Performance' H.T.
'Redgold' Fl.

1972 'Apollo' H.T.
'Portrait' H.T.

1973 'Electron' H.T.
'Gypsy' H.T.
'Medallion' H.T.

1974 'Bahia' Fl.
'Bon-Bon' Fl.
'Perfume Delight' H.T.

1975 'Arizona' H.T.
(In America classed as a Grandiflora)
'Oregold' H.T.
'Rose Parade' Fl.

1976 'America' L.Cl.
'Cathedral' Fl.
'Seashell' H.T.
'Yankee Doodle' H.T.

1977 'Double Delight' H.T.
'First Edition' Fl.
'Prominent' H.T.

1978 'Charisma' Fl.
'Color Magic' H.T.

1979 'Friendship' H.T.
'Paradise' H.T.
'Sundowner' H.T.

(In America classed as a Grandiflora)

1980 'Love' H.T. (In America classed as a Grandiflora)
'Honor' H.T.
'Cherish' Fl.

1981 'Bing Crosby' H.T.
'Marina' Fl.
'White Lightnin' H.T.
(In America classed as a Grandiflora)

1982 'Brandy' H.T.
'French Lace' Fl.
'Mon Cheri' H.T.
'Shreveport' Fl.

1983 'Sun Flare' Fl.
'Sweet Surrender' H.T.

1984 'Impatient' Fl.
'Intrigue' Fl.
'Olympiad' H.T.

1985 'Showbiz' Fl.

1986 'Broadway' H.T.
'Touch of Class' H.T.
'Voodoo' H.T.

1987 'New Year' H.T. (In America classed as a Grandiflora)
'Sheer Bliss' H.T.
'Bonica 82' Shrub

1988 'Amber Queen' Fl.
'Mikado' H.T.
'Prima Donna' H.T. (In America classed as a Grandiflora)

While many of the AARS winners have been successful in India, and some such as 'Helen Traubel', 'Jiminy Cricket', 'Queen Elizabeth', 'Circus', 'Garden Party', 'Christian Dior', 'Tropicana' (the name by which 'Super Star' is referred to in America), 'American Heritage', 'First Prize', 'Double Delight' and 'Paradise' outstandingly so, not much is heard of 'Mission Bells', 'Lilibet', 'John S. Armstrong', 'America' and 'Bing Crosby', and 'Mojave' has proved very temperamental. This indicates that even success over a wide range of conditions in the United States does not permit us to predict similar performance of a variety in India.

As explained in the earlier pages, flowering conditions for roses in India are, with the exception of those in some of the hill stations and mountain valleys, extremely different from those in Europe and America. This explains why certain well-known varieties like 'McGredy's Yellow', 'Peace', 'Karl Herbst', 'Mojave', 'Perfecta', 'Colour Wonder' and 'Uncle Walter' have not been very successful in northern India, while, on the other hand, less-publicized varieties such as 'Tahiti', 'Dr Valois' and 'Kiss of Fire' have proved to be very good roses for Indian gardens. Some varieties described in European catalogues as small or medium-sized, e.g. 'Picture', 'Michèle Meilland' and 'McGredy's Sunset', can produce 12–13-cm. ($4^1/_2$–5-in.) blooms in Delhi's cool weather. It is also interesting that the variety 'Gladiator' (Malandrone, 1955) described in *Modern Roses 8* as a large-flowered climber is now being grown in Maharashtra as a Hybrid Tea commercially for the cut-flower trade. It does not, however, do so well in the Delhi region, because the blooms suffer when nights become very cold.

It is most important to be clear in one's mind of what is expected of the chosen rose varieties. The roses that win the blue ribbons in the shows are often not the ones that will provide the best garden display. A variety for growing in a bed must first of all be very free-flowering. It should not be too tall; it should also be vigorous and not need pampering. Some years ago, one had to choose between the general-purpose 'bedding' rose and the 'exhibition' variety. Nowadays, however, rose breeders have worked wonders, and a few varieties are available, such as 'Double Delight', 'First Prize', 'Montezuma', 'Paradise' and 'Super Star', which combine the flower char-

acters coveted for exhibition purposes with vigour of growth and free-blooming character.

In the earlier editions of this book an attempt was made to list some of the varieties which in the light of personal experience are extremely reliable in that they will grow well under conditions similar to those of Delhi, and also give enough blooms of attractive quality. In the present book, however, a further endeavour has been made to provide lists of suitable varieties in three other important regions, besides that of the region in which Delhi is situated. As explained in the Preface, the lists have been compiled on the basis of information kindly provided by knowledgeable persons whose names are mentioned therein. For convenience, the lists of varieties for the four major regions which have been dealt with are given at the end of this chapter. However, the rose varieties are arranged under the heads: General and Bedding varieties, and Exhibition varieties, though recognizing that, as just mentioned, some modern varieties are equally suitable for both the purposes.

It is necessary to point out that in the plains of northern India many Floribunda varieties do not give a succession of blooms over a long period as they often do in the temperate parts of the world. Differences in temperature and the length of the day are probably responsible for the fact that varieties which provide sheets of colour over a long period in Europe and America do not seem to 'perform' here. But in the Bangalore region (peninsular India) their performance is better, and they are therefore more popular there. I should hasten to add, however, that not all the Floribundas suffer from this disability. Like the Polyanthas which flower over a long period, some Floribundas like 'Else Poulsen', 'Charleston', 'Zambra' and 'Iceberg' do flower over a very long period and are very well worth growing. Among the Hybrid Tea-type Floribundas, a few like 'Bellona', 'Sea Pearl' and 'Pink Parfait' are also very generous and dependable.

Exhibition Varieties

These are the aristocrats of the rose world. Their large shapely blooms are the peak of floral perfection. As remarked already, there was a time when the exhibition variety could be expected to produce

only a few blooms in a year. For instance, 'Glory of Rome' in northern India hardly gave half-a-dozen worthwhile blooms in the whole year. But one or two of these could be so marvellous as to compel admiration of the imperious size, the impeccable form and colour. However, nowadays it is much easier to use varieties like 'First Prize', 'Paradise' and 'Super Star' where every bloom seems to come perfect and keeps its shape for long, while being equally suitable for bedding purposes.

Scented Varieties

As Daphne Barraclough says, 'the story of perfume is a fascinating one, the long fingers of its history parting the mists of time, and always drifting through the ages is the fragrant breath of flowers.' It was probably the fragrance of the rose that endeared it to the ancients at a time when the rose, as a wild or just recently domesticated plant, had flowers which while being pretty were not as spectacular as those of some other flowering plants. This fragrance was not only irresistible but it was released readily to oil and water. In the case of *Rosa gallica*, the petals had the priceless attribute of retaining their fragrance even after decaying.

When one sees a beautiful rose, the first instinctive act is to smell it. Browning wrote: 'Any nose may ravage with impunity a rose.' How disappointing it is if a rose bloom has little or no scent! However, the impression that modern roses are generally scentless while the old ones were mostly scented is incorrect. Among some of the old roses, and the wild ones too, there was little or no perceptible fragrance. But it is true that the proportion of really fragrant roses today is, alas, very small. In recent decades, there has been a movement to encourage the breeding of well-perfumed roses. In the Rose Shows organized by the Royal National Rose Society, the Henry Edland Memorial Medal is awarded annually to the most fragrant rose of the year.

It is not realized by many people as to how many types of rose fragrance there are. N.F. Miller (1962), who conducted a very intensive investigation on rose odours and their chemical compositions, concluded that there are more than 25 elemental odours and many combinations of these. He further noted that the perfume of the vast

majority of the Hybrid Teas can be described by the seven elemental odours: rose, nasturtium, orris, violets, apple, lemon and clove and combinations of these. Miller made the remark that 'people who go through rose gardens without stopping to inhale the fragrance of individual blossoms are getting their pleasure in one dimension only! ... The perfumes of roses are like exquisite chords of music, composed of many odour notes harmoniously blended.'

Some roses are 'fast of their smell', and one has to come near and inhale that fragrance. In *Rosa rugosa* and its near relations, the scent is carried for a few yards. But it is in the Musk group that fragrance is conspicuously air-borne over long distances. *Rosa moschata* and some others are extremely delightful this way. The so-called Hybrid Musks include some which are outstanding in the 'carrying' power of their musky fragrance, e.g. 'Cornelia', 'Felicia' and 'Penelope'. Even some of the modern garden roses can be smelled from some distance, on the right days, among them being 'Crimson Glory' and 'General MacArthur'. The pleasant characteristic fragrance of 'Margaret McGredy' and 'McGredy's Sunset' is strongly air-borne on some days in the rose season. Some of the best scented varieties for India are given below:

The Hybrid Teas

'Avon'
'Blue Moon'
'Chrysler Imperial'
'Clair de Lune'
'Confidence'
'Crimson Glory'
'Double Delight'
'Eiffel Tower'
'Ernest H. Morse'
'Etoile de Hollande'
'General MacArthur'
'Golden Afternoon'
'Granada'
'Hadley'
'Hawaii'
'Heart Throb' (Bhattacharji, 1963)
'Kanakangi'
'La France'
'Laurent Carle'
'Mister Lincoln'
'Mme Louis Laperrière'
'Oklahoma'
'Papa Meilland'
'President Radhakrishnan'
'Prima Ballerina'
'Rajhans'
'Red Ensign'

'Sugandha'
'Sutter's Gold'
'Sweet Surrender'
'Tallyho'
'The Doctor'
'Wendy Cussons'
'Whisky Mac'

The Floribundas

'Arthur Bell'
'Elizabeth of Glamis'
'Loree'
'Magenta'
'Margaret Merril'
'Pink Parfait'
'Rose Sherbet'
'Shocking Blue'
'Spartan'

It is worth recalling here that 'Rose Edouard', which is widely grown in India and is also used as an under-stock, has a perfume of unrivalled sweetness.

Disease-Resistant Varieties

Rose breeders have been handicapped by the absence of suitable donor varieties among existing garden roses for breeding new varieties possessing immunity or a high degree of resistance or tolerance to the most serious diseases like Mildew and Black Spot. In America, Lammerts well known as the breeder of the very popular 'Queen Elizabeth' and several other successful varieties, has worked over a long period to develop Mildew-immune roses and his endeavours culminated in the production of the beautiful daffodil-yellow pillar rose 'Golden Showers'. However, this and some other strains, which appeared to be immune or highly resistant to Mildew, were found to be very susceptible to Black Spot and to another disease called Rust. On the other hand, Griffith Buck of the Iowa State University has been breeding for Black Spot resistance and has introduced the very resistant 'Prairie Princess' some years ago. Another researcher, P. Semeniuk, working at Beltsville, reported the evolution of three varieties immune or very highly resistant to Black Spot. To them he gave the names 'Spotless Gold', 'Spotless Yellow' and 'Spotless Pink'. Their resistance was derived from *R. rugosa*. However, as far as garden varieties are concerned, we still badly need varieties which combine a high degree of resistance with the other qualities desired by the rose grower.

Some varieties are more resistant to diseases than others. Un-

fortunately there is very little information on the subject. This is because so many factors tend to tilt the balance in nature this way or that, and a variety deemed to be resistant in one place may be found susceptible in another.

For those living in regions where Mildew is a serious problem, here is a list of some varieties which sometime ago were considered to be resistant in Europe or America.

'Carrousel'
'Duet'
'El Capitan'
'Golden Showers'
'Golden Slippers'
'Invitation'
'La Jolla'
'McGredy's Sunset'
'Mischief'
'Montezuma'
'Olala'
'Pascali'
'Paul's Scarlet Climber'
'Perfecta'
'Pink Favorite'
'Pink Parfait'
'Queen Elizabeth'
'Sarabande'
'Super Star'
'Suspense'
'War Dance'

There are hardly any varieties which are known to be completely resistant to Black Spot, but the following, according to a Rose Bulletin of the Royal National Rose Society, published a few years ago, were ranked as fairly resistant:

'Allgold'
'Chanelle'
'Eden Rose'
'Ernest H. Morse'
'Evelyn Fison'
'Iceberg'
'Korona'
'Mme Louis Laperrière'
'Peace'
'Pink Favorite'
'Red Favorite'
'Rose Gaujard'
'Stella'
'Super Star'

It has been difficult to get up-to-date information on this subject.

In India, where the Dieback disease is often rampant, specially soon after the pruning of roses, there is unfortunately no reliable information on the resistance of varieties. Wherever some varieties are known to be specially liable to the disease, this has been indicated in the descriptions at the end of the book.

New Roses

Every year sees an ever-increasing number of new roses being released, not only in Europe, America, Australia, New Zealand and



18. 'Rosy Cheeks' (H.T.)

A truly superb bicoloured rose from Scotland which deserves to be widely grown. The velvety bright-red petals are yellow on the reverse (sometimes in our climate it may be more white than yellow), and the large, double, high-centred flowers are of perfect form and scented. Glossy foliage is another asset.



19. 'Jawani' (H.T.)

Luscious orange-red with long-lasting flowers of good shape borne freely on a vigorous bush. One of the brightest of the Indian-raised roses.



20. 'Christian Dior' (H.T.)

Though introduced as far back as 1958, this famous large, high-centred rose of crimson flushed scarlet is still grown in countries like India in spite of a tendency to mildew and little fragrance. It can still win awards at rose shows and is grown to some extent for the cut-flower market in Delhi.



21. 'Granada' (H.T.)

With urn-shaped buds opening out to large, double high-centred flowers in which pink, nasturtium-red and lemon-yellow are blended, this colourful rose, which is also blessed with beautiful fragrance, is deservedly popular.



22. 'Harmonie' (Shrub)

Glowing rosy-salmon. Flower are large and well-shaped, with good lasting quality. This variety from Kordes of Germany is one of the successful recent introductions.



23. 'Abhaya '87' (H.T.)
This striking rose is an important Indian contribution to the so-called "hand-painted" roses.



24. 'Ajanta Caves' (H.T.)

A striking and beautiful rose in which the light apricot to clean ivory petals are edged with scarlet-red, the colour deepening as the flower ages. An all-purpose Indian rose named after the world-famous caves in western India.



25. 'Sugandha' (H.T.)

Released as far back as 1964, this rose-red Indian variety has long buds and a glorious perfume.

Spain, but also in countries like India and Japan. The demand for novelties is so great that large firms arrange to have a minimum of 10,000 bushes of each promising variety in the year of its introduction. The pictures in the catalogues are most glamorous and the descriptions often irresistible. What is one to do, especially when garden space is limited? Some of the new ones may prove to be really outstanding: on the other hand, not every new rose is better than an old one, and some like, 'Frau Karl Druschki', 'Kaiserin Auguste Viktoria', 'Crimson Glory' and 'Picture' have never been really surpassed. I agree with Harry Wheatcroft when he states: 'Believe me, some of the roses we had, and which some growers have since discarded, are still so good that those who have dropped them might well hail them all over again, as the ones they have been looking for...if only they could come back with new names.' Some people have questioned whether we really need more varieties considering that we have such a tremendous diversity of roses already available. Others, however, have pointed out that in a world which is getting more drab, more crowded and more materialistic, the soothing and elevating qualities of the rose will be needed even more in the future. They draw attention to the fact that in recent years some varieties have been added which are clearly a great advance on what was available earlier—for instance varieties like 'Paradise' and 'Double Delight'. There is no doubt therefore that rose breeding will continue on an even greater scale to create improvements in directions like disease resistance and frost tolerance, in which we have made relatively little progress. But the average grower will need guidance on how to choose from the multitude of varieties available, what is really most suitable for him. In some countries, well-conducted trials provide the requisite information. Let us hope that in this country, too, we will be able to organize well-planned and carefully conducted trials of new roses, to give rose-lovers throughout the country a firm basis of experience from which to select. Meanwhile the wisest thing to do perhaps is to pay heed to Pope's counsel:

Be not the first
By whom the new is tried,
Nor yet the last
To lay the old aside.

THE GREAT NORTHERN PLAIN

This vast area of land, traversed by the great river Ganga and its tributaries and characterized mainly by alluvial soils, stretches from Punjab, Haryana and part of Rajasthan (with their relatively severe winters) in the west to Bihar and Bengal in the east (where the winters are mild). The conditions in Bengal, particularly with its heavy rainfall and high humidity, offer a very different set of conditions for the cultivation of roses. This portion of the plains therefore has been considered as a separate region.

Bedding and General Purpose

The Hybrid Teas
WHITE: 'Honor', 'Jawahar', 'Louisiana', 'Virgo', 'White Masterpiece'.
PINK: 'Century Two', 'Dr B.P. Pal', 'First Prize', 'Lalima', 'Michèle Meilland', 'Mrinalini', 'Picture', 'Princess Margaret of England', 'Priyadarshini', 'Sabine', 'Sonia'.
YELLOW: 'Ganga', 'Golden Giant', 'Gold Medal', 'Helmut Schmidt', 'McGredy's Sunset', 'Summer Sunshine'.
ORANGE-SCARLET, CORAL AND VERMILION: 'Doris Tysterman', 'Fragrant Cloud', 'Jawani', 'Just Joey', 'Montezuma', 'Super Star'.
APRICOT TO ORANGE-YELLOW: 'Brandy', 'Kanakangi', 'Peach Beauty'.
RED TO DARK CRIMSON: 'Bhim', 'Lal Bahadur', "Mister Lincoln', 'Precious Platinum'.
LAVENDER: 'Blue Moon'.
BICOLOURS: 'Love', 'Mascotte'.
COLOUR BLENDS: 'Double Delight', 'Granada', 'Kiss of Fire', 'La Jolla', 'Paradise'.

The Floribundas
WHITE: 'Himangini', 'Iceberg'.
PINK: 'Delhi Princess', 'Else Poulsen', 'Loree', 'Queen Elizabeth'.
YELLOW: 'Bellona'.
ORANGE: 'Belinda'.
ORANGE-SCARLET, CORAL AND VERMILION: 'Evelyn Fison', 'Flamenco', 'Kumkum', 'Surya Kiran'.

RED TO DARK CRIMSON: 'Europeana', 'Lorna Doone'.
LAVENDER: 'Neelambari', 'Shocking Blue'.
COLOUR BLENDS AND BICOLOURS: 'Anita', 'Banjaran', 'Bhagmati', 'Charisma', 'Charleston', 'Chitchor', 'First Edition', 'Judy Garland', 'Madhura', 'Sea Pearl'.

The Polyanthas
WHITE: 'Katharina Zeimet'.
PINK: 'Chatillon Rose', 'Echo', 'Pink Shower', 'Priti'.
ORANGE: 'Paul Crampel', 'Vatertag'.
RED: 'Ideal'.
MAUVE: 'Bharani'.

Exhibition Purpose
WHITE: 'Dr Homi Bhabha', 'Honor', 'John F. Kennedy', 'Louisiana', 'Matterhorn', 'Pristine'.
PINK: 'Bel Ange', 'Century Two', 'Dr B.P. Pal', 'Eiffel Tower', 'First Prize', 'Mrinalini', 'Peter Frankenfeld', 'Royal Highness', 'Ratnaar', 'Dil ki Rani'.
YELLOW: 'Golden Giant', 'Helmut Schmidt', 'Sunblest'.
ORANGE-SCARLET, CORAL AND VERMILION: 'Fragrant Cloud', 'Super Star', 'Angelique'.
APRICOT TO ORANGE-YELLOW: 'Brandy'.
RED TO DARK CRIMSON: 'Alec's Red', 'Avon', 'Christian Dior', 'Mechak', 'Oklahoma', 'Papa Meilland'.
LAVENDER: 'Blue Moon', 'Violaine', 'Lady X'.
COLOUR BLENDS AND BICOLOURS: 'American Heritage', 'Doris Tysterman', 'Eiko', 'Garden Party', 'Granada', 'Kiss of Fire', 'Paradise', 'Parthenon', 'Rose Gaujard', 'Srinivasa', 'Surkhab'.

THE EASTERN GANGETIC PLAIN

The Eastern Gangetic Plain, comprising the plains area of Bengal and the adjoining portions of Bihar and Orissa, was at one time a fairly important area for rose growing and a number of the best rose nurseries of the time were situated in the Santhal Parganas region on the borders of Bengal and Bihar. There are still a large number of persons in this area interested in roses. Given below is a

list of some of the varieties considered most suitable for general purpose and for exhibition.

Bedding and General Purpose

The Hybrid Teas

'Alec's Red', 'Black Lady', 'Caribia', 'Confidence', 'Double Delight', 'Lady X', 'Lal Bahadur', 'Montezuma', 'Paradise', 'Summer Holiday'.

The Floribundas

'Anne Harkness', 'Bon-Bon', 'Double Talk', 'Greensleeves', 'Golden Times', 'Judy Garland', 'Matangi', 'Queen Elizabeth', 'Samba', 'Shocking Blue'.

The Polyanthas

'Border King', 'Chatillon Rose', 'Echo', 'Flamboyant', 'Orange Triumph', 'Red Vatertag', 'Sea Foam', 'Snow Queen', 'Sneprinsesse', 'Vatertag'.

The Miniatures

'Chandrika', 'Chipper', 'Cuddles', 'Dreamglo', 'Green Ice', 'Mary Marshall', 'Rise 'n Shine', 'Starina', 'Strawberry Swirl', 'Sun Maid'.

Exhibition Purpose

The Hybrid Teas

'Agéna', 'Blue Nile', 'Double Delight', 'First Prize', 'Fontainebleau','Gold Medal', 'Laura', 'Love', 'Lover's Meeting', 'Miss Harp', 'Toro', 'White Masterpiece'.

The Floribundas

'Delhi Princess', 'Friesia', 'Else Poulsen', 'Iceberg', 'Imperator', 'Queen Elizabeth', 'Shocking Blue', 'Zorina'.

The Polyanthas and Miniatures

The varieties mentioned above under bedding and general purpose do well for exhibition also.

THE CENTRAL INDIAN REGION

This region includes Madhya Pradesh and the adjoining portions of the neighbouring states. It is characterized by black soils of varying depths and there are also areas with alluvial and red soils. Climatically, the region is arid, though some parts do receive a higher rainfall; the short winters are cold, though not as severe as in the northern region, and the summers are hot.

Bedding and General Purpose

The Hybrid Teas
WHITE: 'Dr Homi Bhabha', 'Honor', 'Jawahar', 'John F. Kennedy', 'Lemon Sherbet', 'Matterhorn', 'White Masterpiece', 'Virgo'.
PINK: 'Aquarius', 'First Prize', 'Haseena', 'Maria Callas', 'Michèle Meilland', 'Mrinalini', 'Mullard Jubilee', 'Peter Frankenfeld', 'Sonia Meilland'.
YELLOW: 'Apollo', 'Gold Medal', 'Sunblest', 'Summer Sunshine'.
ORANGE-SCARLET, CORAL AND VERMILION: 'Atoll', 'Comanche', 'Command Performance', 'Fragrant Cloud', 'Indian Princess', 'Just Joey', 'Montezuma', 'Raja Surendra Singh of Nalagarh', 'Super Star'.
RED TO DARK CRIMSON: 'Christian Dior', 'Crimson Glory', 'Happiness', 'Papa Meilland', 'Precious Platinum'.
COLOUR BLENDS AND BICOLOURS: 'American Heritage', 'Double Delight', 'Garden Party', 'Granada', 'Kiss of Fire', 'Parthenon'.

The Floribundas
WHITE: 'Hakuun', 'Himangini', 'Iceberg', 'Summer Snow'.
PINK: 'Bon-Bon', 'Bridal Pink','Delhi Princess', 'Elizabeth of Glamis', 'Pink Parfait'.
YELLOW: 'Friesia'.
ORANGE-SCARLET, CORAL AND VERMILION: 'Shola'.
RED TO DARK CRIMSON: 'Europeana'.
LAVENDER: 'Angel Face', 'Deep Purple', 'Neelambari'.
COLOUR BLENDS AND BICOLOURS: 'Banjaran', 'Charisma', 'Charleston', 'First Edition', 'Prema', 'Sabre Dance', 'Sea Pearl'.

The Polyanthas

'Echo', 'Muttertag', 'Orange Triumph', 'Red Triumph', 'Sneprincesse', 'Vatertag'.

The Miniatures

'Hula Girl', 'Judy Fischer', 'Lavender Jewel', 'Mary Marshall', 'Puppy Love', 'Pushkala', 'Sun Maid', 'White Angel'.

Exhibition Purpose

The Hybrid Teas

WHITE: 'Dr Homi Bhabha', 'Honor', 'John F. Kennedy', 'Matterhorn', 'Pascali', 'White Masterpiece'.

PINK: 'Anurag', 'Dolee Vita', 'First Prize', 'Michèle Meilland', 'Mrinalini', 'Peter Frankenfeld', 'Royal Highness', 'Sonia Meilland'.

YELLOW: 'Miss Harp', 'Summer Sunshine'.

ORANGE-SCARLET, CORAL AND VERMILION: 'Bing Crosby', 'Command Performance', 'Montezuma'.

APRICOT TO ORANGE-YELLOW: 'Medallion', 'Ambassador'.

RED TO DARK CRIMSON: 'Bhim', 'Christian Dior', 'Oklahoma', 'Papa Meilland', 'Toro'.

LAVENDER: 'Blue Moon', 'Lady X', 'Violaine'.

COLOUR BLENDS AND BICOLOURS: 'American Heritage', 'Garden Party', 'Granada', 'Srinivasa'.

The Floribundas

WHITE: 'Himangini', 'Hakuun', 'Summer Snow'.

PINK: 'Delhi Princess', 'Pink Parfait'.

YELLOW: 'Friesia'.

ORANGE-SCARLET, CORAL AND VERMILION: 'Shola', 'Zorina'.

COLOUR BLENDS AND BICOLOURS: 'Banjaran', 'Charisma', 'First Edition', 'Nav Sadabahar', 'Prema', 'Sea Pearl'.

THE DECCAN PLATEAU AND ADJACENT COASTAL AREAS

The information available is mainly for the western portion of the Deccan plateau, particularly the areas adjacent to Nasik and

Pune, which have become very important recently for the production of cut roses for the Bombay and other markets. The varieties listed below should, however, be suitable for the plateau in general. In the coastal areas characterized by hot and humid climate with heavy monsoon rain and strong winds at certain times of the year, there is not very much of rose growing. In Bombay city, however, in spite of all the problems, the culture of growing roses in strong earthen or cement pots has come up and dedicated rosarians are able to produce good roses by a rigorous regimen of feeding, watering and frequent spraying with pesticides and fungicides.

Bedding and General Purpose

The Hybrid Teas
WHITE: 'John F. Kennedy', 'Pascali'.
PINK: 'Confidence', 'Eiffel Tower', 'Maria Callas', 'Peter Frankenfeld'.
YELLOW: 'Sunblest', 'Mabella', 'Sun King'.
ORANGE-SCARLET, CORAL AND VERMILION: 'Summer Holiday'.
RED TO DARK CRIMSON: 'Gladiator'*, 'Papa Meilland'.
LAVENDER: 'Blue Moon', 'Paradise'.
COLOUR BLENDS AND BICOLOURS: 'Double Delight', 'Inge Horstmann', 'Love'.

The Floribundas
WHITE: 'Summer Snow'.
PINK: 'Dearest', 'Queen Elizabeth'.
ORANGE AND ORANGE BLENDS: 'Belinda', 'Elizabeth of Glamis'.
RED TO DARK CRIMSON: 'Pussta'.
LAVENDER: 'Angel Face'.
COLOUR BLENDS AND BICOLOURS: 'Judy Garland', 'Nimes', 'Sea Pearl'.

The Polyanthas
'Bharani', 'Margo Koster', 'Muttertag', 'Nartaki', 'Orange Triumph', 'Sneprincesse', 'Vatertag'.

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* A large-flowered climber according to *Modern Roses 8*.

The Miniatures

'Beauty Secret', 'Chipper', 'Gloriglo', 'Jet Trail', 'Lavender Jewel', 'Over the Rainbow', 'Rosmarin', 'Starina', 'Stars 'n Stripes', 'Strawberry Swirl'.

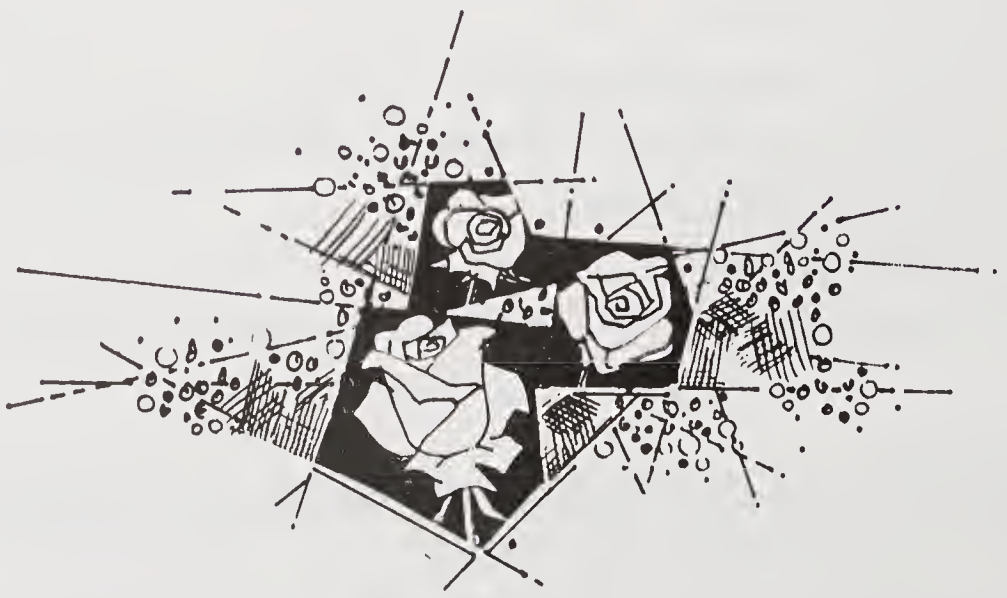
Exhibition Purpose

The Hybrid Teas

WHITE: 'John F. Kennedy', 'Pascali', 'Pristine'.
PINK: 'Confidence', 'First Prize', 'Fontainebleau', 'Maria Callas'.
YELLOW: 'Garden Party', 'Sunblest', 'Miss Harp', 'Sun King'.
ORANGE-SCARLET, CORAL AND VERMILION: 'Fragrant Cloud', 'Summer Holiday'.
APRICOT TO ORANGE-YELLOW: 'Yankee Doodle'.
RED TO DARK CRIMSON: 'Christian Dior', 'Gladiator', 'Oklahoma', 'Papa Meilland', 'Swarthmore'.
LAVENDER: 'Blue Moon', 'Lady X', 'Paradise'.
COLOUR BLENDS AND BICOLOURS: 'Anvil Sparks', 'Double Delight', 'Inge Horstmann'.

The Floribundas

The varieties mentioned under bedding and general purpose do well for exhibition purpose also.



CHAPTER 6

HOW TO PLANT AND GROW ROSES

ONCE the rose garden has been planned, it is not difficult to estimate the exact number of plants of each variety and class required for planting. If the plants are to be obtained from a nursery, the order should be placed well ahead of the time of planting to ensure the delivery of plants at the right time. Most nurserymen follow the principle of 'first come, first served', and in northern India the appropriate time for ordering the plants is not later than March or April because the choicer varieties and the novelties tend to get 'booked' early.

Preparation of Beds and Pits

The beds or pits which are to receive the plants must be prepared at least a month before the date of planting. The preparation of beds may be taken up during May or June so that the soil gets a thorough exposure to sun and air, and during the rainy season it gets a chance to settle down before planting. When only a few roses are to be planted at individual sites, the planting can be done in circular pits, about 60–90 cm. (2–3 ft.) across and 60–75 cm. (2–$2^1/_2$ ft.) deep. The pits are generally dug with the help of a spade or *khurpi*, but this can be done more conveniently and quickly with an implement like an earth-auger, if available. About half a bucket of cowdung manure and a handful of bonemeal should be mixed with half the quantity of the soil taken out from the pit. The prepared soil can then be returned to the pit before filling it up with the rest of the soil.

The beds are prepared by digging with a spade to a depth of 60–75 cm. (2–$2^1/_2$ ft.), which can be conveniently done by double-digging. Usually a trench, about 45–60 cm. ($1^1/_2$–2 ft.) across the width of the bed, is dug about 30 cm. (1 ft.) deep with a spade and the

soil heaped outside at one corner of the bed. If the bed is situated on the lawn, it is better to heap the soil on a tarpaulin or a gunny bag to avoid damage to grass. The trench is again dug thoroughly to a depth of 30 cm. with the help of a fork. While forking, a basketful of well-rotten cowdung manure and a double-handful of bonemeal may be mixed in the soil. Another similar trench is dug out in continuation of the first one. The top 30-cm.-deep soil from the second trench is used to fill in the first trench, which had been dug out previously. The second trench is then forked to a depth of 30 cm., manured, and is filled with the top 30-cm. soil from a third trench. Digging in this manner is continued till the whole bed is dug out completely. The soil taken out from the first trench and heaped outside the bed is used for filling in the last trench. The top soil of the bed can be prepared finely just before planting.

The bed should be made at the level of the surrounding ground, lawn or path, as it will sink slightly later. If the soil of the bed is a heavy clay with poor drainage, it is advisable to raise the level of the bed to 5–10 cm. (2–4 in.) above the ground. Generally, to improve the heavy clay soil, hydrated lime at the rate of 1.5 kg. to a square metre (5 oz. to a square foot) is forked 30 cm. (1 ft.) deep into the soil at the bottom of the bed. Sometimes gypsum is recommended in place of lime and it is applied to the top 5 cm. (2 in.) of the soil, about $^1/_2$ kg. to a square metre (2 oz. to a square foot). On the other hand, if the soil is light or sandy, plenty of compost or farmyard manure will be needed to improve its water-holding capacity.

Handling the Plants

The new rose plants, the so-called 'maidens', require careful handling when received from the nursery. If the pits or beds are not ready, or if for any other reason, such as heavy rain, it is not possible to plant immediately, it is advisable not to unpack the parcel but to keep it in a cool place and sprinkle a little water over the plants, especially on the roots, from time to time. The parcel should be unpacked with care. Generally in our country the nurseries supply rose plants with the earth-ball intact around the roots. The earth-balls are packed in moist straw or grass and are sometimes also wrapped in alkathene to keep the roots moist for a long time. These

new plants are often pruned lightly before they are supplied. However, if there are still some dead or unhealthy twigs, they should be cut away with a sharp secateur. A fungicidal paint containing equal parts of copper carbonate and red-lead (by weight) and enough of linseed oil to make it a thick paste should be applied to the cut ends to prevent the entry of the Dieback disease. It would also be useful to cut all diseased and damaged leaves from the stem, leaving their stalks on the plant, as they help in obtaining quick and good growth. If there are any flower buds, these should also be removed. The upper end of the root-stock, commonly called the 'snag', projecting just above the bud union, is often removed by the nurserymen before supplying the plants; otherwise it should be cut off with the secateur, as close to the main stem as possible. The extra-long roots, if any, can be shortened with a sharp clean knife so as to encourage the growth of new fibrous roots, which are the main suppliers of food to the plant. When the new plants are received for planting during September or October, they may sometimes be found infested by Red Scale insects. The plants should then be sprayed, a couple of days before planting, in accordance with the recommendations made in Chapter 10. If there are only a few infested plants, it would be convenient to rub the affected parts of the stem with a wad of cotton-wool soaked in methylated spirit.

The nurseries abroad usually supply plants with naked roots and some Indian nurseries have also adopted this practice. If such a plant is obtained, it should be handled in the same manner as described above. However, it is always useful to dip the roots in water for a few hours before planting. If the plants cannot be planted immediately because the site is not ready to receive them, it would be advisable to cover the roots with moist gunny bags to prevent them from drying.

A few nurserymen in eastern India supply plants with the roots tightly covered by a small ball of very stiff clay. This helps to keep them alive in transport, but unless the clay is removed at planting time, the plants will be suffocated to death.

When to Plant

The best time for planting roses in the plains is during Septem-

ber or October after the cessation of the rains, and it can be extended till the end of November. To obtain good-quality blooms in early December, when most of the Rose Shows are held, it is advisable to plant early. However, it must be pointed out that planting can be done at almost any time of the year in the plains, if care is taken. In very hot weather, for instance, shading of plants for a few days after planting may be prudent. But it is better to avoid planting during April–June, when hot desiccating winds blow. During the monsoon, planting should be avoided after heavy rain, when the ground is soaked. In the hills planting can be done during October–November, or during February–March, depending upon the temperature, the former planting time being considered better.

How to Plant

Before planting, the top 30 cm. (1 ft.) of the soil from the individual pits should be removed. The plant along with the earth-ball may then be gently lowered into the pit, keeping the main stem in the centre of the pit. The bud-union point, where the scion joins the stock, is kept just above the ground level. Generally the nurseries in foreign countries bud the roses close to the roots of the stock, but in our country the budding is done 5–7.5 cm. (2–3 in.) above the root junction. Plants in which the point of bud-union has gone below the soil seldom grow as well as those in which it is kept just above the ground. It is also easier to detect suckers when the bud-union point is visible. While planting, it is necessary to spread out the roots evenly if these are naked. In the case of plants with bare roots it also helps if one makes a small 'hump' of soil at the bottom of the pit to support the base of the plant. The soil which was taken out before putting the plant is returned to the pit and 'firmed' either with hands or by treading with feet, from the outside of the pit towards the centre. The plant must be watered copiously immediately after planting.

While planting in beds, the distances and the actual sites of the plants should be marked out. The distance of planting is generally 60–75 cm. (2–$2^1/_2$ ft.) between plants and rows, depending upon the vigour of the varieties. The more vigorously growing varieties like 'Golden Giant', 'Super Star', 'South Seas', and 'Queen Elizabeth'

require a greater planting distance than others. The Dwarf Polyanthas can be planted about 45 cm. ($1^1/_2$ ft.) apart. The end rows of plants should be 30–45 cm. (1–$1^1/_2$ ft.) away from the edge of the bed. For the Miniature roses, which are becoming important, though not to the extent in Europe and America, the spacing may be 30 cm. (1 ft.) apart. But it must be remembered that in some parts of the country which experience long periods of humid heat, the plants become larger than in the temperate zone and the spacing will have to be adjusted accordingly. The Standards are generally planted at distances of 90–120 cm. (3–4 ft.), and the Climbers are spaced 3 m. (3 yd.) or more apart. The number of rows and plants in a bed will obviously depend upon the size of the bed and the distance of planting.

At the marked distances where the roses are to be planted, a pit of a suitable size and depth should be dug and prepared as described in the preceding paragraphs. The planting can also be done in a similar manner as suggested for the individual pits. Sometimes the newly planted roses may have to be protected from the hot sun, strong wind or heavy rain, at or soon after planting.

It is always a good practice to label the plants with permanent metal or plastic labels. Usually the plants supplied by a nursery have a label on each plant, but this is often not of a permanent type. It is desirable also to make a planting plan on a piece of paper and to keep this for future record. While planting the Standards it would be better to have a bamboo stake painted green, of suitable height, in position before putting in the plants. A stake inserted after planting may sometimes injure the roots when it goes down deep and near the roots.

Transplanting

Some plants need transferring from one site to another, for they may not be doing well there, or the lay-out of the garden is to be altered, or the soil of that site is exhausted. The old, established plants should then be carefully dug out with the ball of earth adhering to the roots. To facilitate digging, the plants should be watered lightly one or two days before they are lifted. Due care must be taken not to injure the roots while lifting the plant, and a long fork

should be preferred to a spade which might injure the roots. The uprooted plants should immediately be planted at their new sites, which should have been prepared and kept ready sufficiently ahead of the transplanting day. The soil around the newly planted roses should be 'firmed' by treading and watered heavily immediately afterwards. Transplanting in the plains can be done during the normal planting time, or even at other times of the year as suggested earlier. In the hills it is best done during October–November.

After-Care

The newly planted roses require frequent watering in the beginning. After that they may be watered once in five days during summer, and once in ten days during winter, but it must be remembered that the type of the soil makes a great deal of difference. If the soil is sandy, more frequent watering may be necessary; on the other hand, if it is heavy and retentive of moisture, the watering interval may have to be increased. The soil should be hoed lightly, preferably with a fork, after each watering, when the soil is 'in condition', i.e. when its top begins to dry. Care must be taken not to dig deep or near the base of the stem, as this may injure the roots and the stem. Weeds can be pulled out while hoeing the beds. Roses do not like 'wet feet'. Care should be taken to avoid stagnation of water too long in the beds or near the base of the plants, as it is harmful to the roots. Proper drainage is essential and, if the soil of the beds is heavy, it is advisable to add sand.

Suckers, which originate from the roots of the stock, often appear near the base of the stem. These must be removed frequently to prevent the loss of vigour of the plants. While removing the suckers, one should be careful to distinguish them from the new growth of the budded variety of the scion itself, which may also sometimes appear from the base of the stem, particularly when the budded point is a little below the ground level. The basal shoots are usually the strongest and so are well worth preserving if they belong to the scion. The shape, size and colour of the leaves help to distinguish the suckers from the growth of the scion. The suckers should be removed at the point of their origin and not merely cut off at the ground level. In doing so it may sometimes be necessary to

remove a few inches of the soil below the surface. In the Standards the suckers may appear high up on the main stem of the root-stock. These should also be removed as and when they appear.

Disbudding or removal of the side-buds in the large-flowered types is beneficial in obtaining good-quality blooms, especially for exhibition purposes. The weak and underdeveloped buds are removed, keeping one on each branch to produce flowers.

The first one or two 'eyes' immediately below the flower or the hip are not likely to give rise to good side-shoots. Always, therefore, faded flowers and hips should be cut down to a leaf that has at least five leaflets (those at the very top usually have three or less). Frequently cutting the flowers with very long stems will, however, ultimately weaken the plant.

Faded flowers and hips, if any, should be removed, especially after the first flush of flowering is over in early January, to obtain better-quality blooms in the subsequent main flush of flowering, which usually comes in March–April. The removal of faded flowers and hips also helps in getting good and vigorous growth of branches, which will ultimately result in more and better flowers.

Pruning and manuring should be attended to at the right time, and a regular check on the first appearance of diseases and pests is always useful in controlling them. As a preventive measure, fungicides and insecticides should be sprayed or dusted regularly at the appropriate time, particularly during the periods when these diseases and pests are generally known to appear. Detailed information on the feeding of rose plants and on the control of common diseases and pests is given in separate chapters.

Summer Care

After the spring flush is over in March–April, mulching with well-rotten cowdung manure or leaf-mould will be beneficial in conserving moisture and checking the growth of weeds during summer. Later, after summer, the manure and leaf-mould can be forked into the soil.

During summer the plants need frequent watering. The faded flowers and hips should be removed frequently. It is important to watch for Dieback and to cut off the diseased part immediately. Very

young plants, or those recently moved, may require protection from hot sun and wind. Such plants can be covered with mats or *sirkis* to provide shade.

The stakes supporting the Standards should be checked regularly to see that they are in position during summer, when they are likely to get damaged by strong winds if not fastened properly. Similarly, the branches of Ramblers and Climbers should be tied to the wall, pergola, arch or pillars, so that they do not break away when there is a strong gust of wind. Spraying the plants with water in the evening may often prove advantageous during hot days.

The newly potted roses may be shifted to partial shade or to the verandah to protect them from hot sun and wind and to prevent the scorching of young growing shoots. They also need protection from heavy rains. However, if kept in too much shade they will become etiolated, i.e. pale and lanky.

Winter Care

In the plains, roses do not require any particular care during winter. In fact this is the best season for rose flowers. But in the higher hills, where winter is severe, rose plants do require some special care. The frost-bitten young shoots, which usually become brown inside, should be cut back to a point where the pith is again white. If affected by frost, the young buds or leaves may also be removed. The newly planted young plants should be protected from heavy snow and frost from December to February, specially when the planting has been done late. In the very cold regions in Europe and America, plants are protected in winter by covering the base where the stems spring from within a mound of earth. Sometimes even the tops are covered with hay and straw as an additional protection. Another practice is to cut the plants back to 40–45 cm. (16–18 in.) high after the first severe frost. A recent practice in cold countries is to use an artificial material like Styrofoam for saving the plants through the winter.

The plants should be examined after heavy rains and after snowfall, and all loosened branches of Ramblers and Climbers should be tied up again. The stakes of Standards should also be put back in position if they have fallen down. During the rainy season,



26. 'Honor' (H.T.)

This stately white rose is one of the best in this colour among those introduced into India in recent years



27. 'Mrinalini' (H.T.)

One of the more important Indian varieties. The large well-shaped pink blooms have on several occasions won awards at rose shows.



28. 'Mister Lincoln' (H.T.)

Magnificient dark-velvety blooms with rich 'old rose' fragrance are generously produced on a tall, vigorous bush. One of the very best reds for conditions like those of Delhi.



29. 'Gold Medal' (H.T.)

The medium to large golden flowers acquire a red edge in certain weathers but are always attractive.



30. 'Doris Tysterman' (H.T.)

The rich tangerine and orange colour appeals to everyone. Tall, upright and very vigorous bush.



31. 'Kanakangi' (H.T.)
Globular buds open out to fascinating flowers of bright gold and apricot. Beautiful spicy fragrance. A display of flowers of this variety always attracts favourable attention in rose shows in Delhi.



32. 'Golden Afternoon' (H.T.)

A glorious blend of orange and apricot. The freely-produced flowers are not large but of beautiful form and possess an exquisite spicy fragrance. Glossy leaves.



33. 'Jawahar' (H.T.)

Large, double white flowers of good shape are freely produced. The white may be shaded sometimes with cream. Good for bedding and very occasionally for exhibition.

water should not be allowed to stagnate in the bed or near the base of the plant, and any excess must be drained away as quickly as possible.

Renovation of Neglected Plants and Beds

When roses are not pruned or manured or hoed properly, and generally not looked after carefully, they may decline in vigour; the bushes will look gawky and produce a few inferior-quality blooms. However, it is not difficult to renovate these neglected roses. During the normal planting time in September and October, the old plants should be taken out along with the earth-ball, and replanted in a new bed. If they are to be planted in the same bed, it would be necessary to dig up the entire area to a depth of 60–75 cm. (2–2 $^{1}/_{2}$ ft.) and manure it with well-rotten cowdung and bonemeal, as suggested earlier for the regular planting. Before replanting, the roses should be pruned and the old leaves removed to ensure success in transplanting. While the bed is being prepared to receive the plants, it is helpful to keep the uprooted plants in the shade and cover their earth-balls with moist gunny bags. In the hills renovation can be done in October–November.

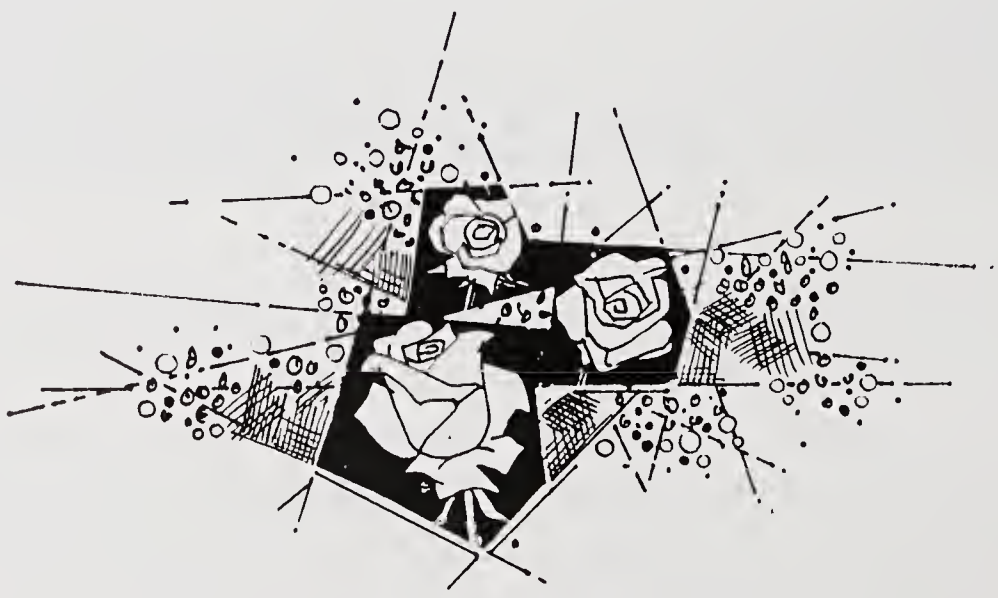
After the plants have established, they should be treated in the same manner as the others. Adequate and timely pruning, manuring, watering, hoeing and spraying of insecticides and fungicides are essential for the proper maintenance of the plants.

The soil in which roses have been grown continuously for a number of years sometimes tends to become 'rose sick', resulting in poor growth and flowering of plants. In such cases it is beneficial to dig out the soil to a depth of 60–75 cm. (2-2 $^{1}/_{2}$ ft.) in April or May, and replace it with good, fresh soil collected from some other place and manure it. Afterwards the same roses can be planted in the bed. However, if the same old plants are not being restored, a green-manure crop should be grown. If sown in June or July, it will grow quickly and can be cut down and incorporated into the soil by the middle of August. The green matter should be allowed to decompose thoroughly, else White Ants will give trouble. The roses should then be planted by the end of September or early in October. Green manure is very beneficial in restoring jaded rose beds to their

original productiveness.

Growing in Glass-Houses

In many foreign countries roses are grown successfully in glass-houses by both amateurs and nurserymen. In the recent past, polythene of requisite grade is replacing glass. In our country roses are grown in the open only. The main advantage of growing under glass or polythene is that the plants thrive under a controlled environment, without any trouble from excessive rain, water-logging, strong wind, frost, hot sun or snow, and their flowering can be extended to several months in the year. This method of cultivation is especially adopted by florists for obtaining a succession of quality blooms throughout the year, particularly during the 'off season', when prices for cut flowers are very remunerative. Usually glass-houses are heated and the plants are grown in pots. In our country reducing the temperature inside glass-houses is necessary in the plains during summer, but it is very expensive. The choice of varieties is an important consideration, and only varieties fit for 'forcing', and which can be grown successfully in pots, are suitable for glass-house culture. Pruning, manuring and other cultural operations are done in the same way as for plants grown in pots in the open.



CHAPTER 7

THE FEEDING OF ROSE PLANTS

WHILE the wild roses are able to flourish in the environments to which they are adapted, cultivated varieties require adequate, balanced feeding if they are to give quantities of good-quality blooms season after season. The kind of manures, fertilizers and soil amendments required will vary with the nature of the soil and its acid or alkaline reaction.

Each rosarian has his own views on the best way of fertilizing his soil. In ancient times, according to one writer, the burying of a dead donkey under the rose bushes was the secret of achieving outstanding results. In modern times the items utilized are less dramatic than the example cited; nevertheless the range is quite remarkable. Some believe in pigeons' droppings, others advocate sheep- and goat-dung, and some swear by horse-dung. Leaving aside special or secret formulas, let us consider the matter of soils, manures and fertilizers in the light of scientific knowledge.

A soil for growing roses is to be judged on the basis of its depth, texture, structure, permeability, drainage, acid or alkaline reaction and the amount of soluble salts. The requirements for the successful growing of roses are fertile clay-loam or loam (but preferably clay-loam) soils of about one-metre depth, with crumb-like structure, good subsoil permeability and adequate drainage to prevent water-logging even when the rainfall is heavy. Traditionally it has been considered that roses do best in soils having a pH between 6.0 and 7.5, i.e. soils which are either slightly acid, neutral or slightly alkaline. But Dr A.S. Thomas of Australia, with his vast knowledge of roses, has stated that roses do very well in soils ranging from pH 6.5 to pH 8.0 or even 8.5. In India also, roses are grown successfully in soils with a pH value of 8.0 or even slightly higher. However, in soils with a pH of 8.0 or somewhat more, it is important to use the correct

root-stock in order to obtain good results. Dr Thomas has pointed out that *Rosa indica* has adaptability to a wide range of climates and soils and is eminently suited to hot, dry, alkaline conditions of many of the world's foremost rose-growing areas. Experience in northern India also indicates that *indica* stock is to be preferred to *multiflora* for the alkaline soils which predominate in this region.

It is quite likely that only occasionally one would come across a soil which will be found inherently ideal for rose-growing. Few plants respond so well as roses to soil management, and, in fact, proper soil management is the key-word for success in rose culture. Therefore, unless there is something basically wrong with the soil or the climate, it should not be difficult to follow management practices designed to provide the optimum conditions for the rose to grow and develop. In other words, a rose-grower should know the nature of the soil and take suitable steps to bring about the necessary improvements in the soil conditions.

If the soil is not deep enough, it will be necessary to transport enough soil from outside to the site and give it the necessary depth. If the soil is a sandy loam or consists mainly of sand, it will be advisable to mix some good clay soil with it; conversely, if the soil is a clay, sand will have to be mixed to give the necessary texture. In addition, heavy application of well-rotten organic matter, e.g. farm-yard manure, about a large basketful to each plant, will prove beneficial in both these cases. Drainage is very important for successful rose-growing. If there is any obstruction to internal drainage, the layer impeding proper drainage must be removed by digging; alternately, this layer can be shattered or broken up with suitable implements.

If the pH of the soil is much less than 6.0, the rose plant is not likely to do very well because of non-availability of some of the essential plant nutrients. Such soil conditions need to be corrected by putting well-ground (100-mesh) dolomitic limestone or agricultural lime, where available, in the soil. The quantities to be added depend on the nature of the soil, and the best guide is to apply as per the lime-requirement data supplied by the Regional Soil-Testing Laboratory. It is important to take care not to over-lime the soil; otherwise the plants would suffer from 'over-liming injury' and some of the micro-



34. 'Futura' (H.T.)

Long, pointed buds of brilliant vermilion open out to beautiful flowers borne on a vigorous somewhat tall bush. A few plants of this will brighten up the garden and act as a foil to the quieter-coloured varieties.



35. 'Super Star' (H.T.) In America known as 'Tropicana'

When first introduced, this masterpiece of a rose by Math. Tantau astonished the world by its colour and has for long been one of the world's favourite roses and rated with 'Peace' as among the truly great roses of the twentieth century. The sheer loveliness of its luminous light vermilion appears to defy photographic technology.



36. 'Helmut Schmidt' (H.T.)

Glowing, even light-yellow flowers of perfect form are freely produced. One of the best yellow roses introduced into India.



37. 'Nefertiti' (H.T.)

Named after an Egyptian queen renowned for her beauty, this Indian rose has beautiful form and exquisite colour.



38. 'Julia's Rose' (H.T.)

Represents one of the newest colours in roses, sometimes described as parchment-brown. It is a flower-arranger's delight, though the bloom opens fast and the colour tends to fade.



39. 'Hot Pewter' (H.T.)

This brilliant orange-red of fine shape from the famous breeder Jack Harkness really compels attention.



40. 'Cara Mia' ('Dearest One') (H.T.)
The flowers are large, dark velvety red, fragrant.



41. 'Rampa Pal' (H.T.)

The large, very double, high-centered flowers are of an attractive pink blend. Glossy leaves, bushy growth.

nutrients would not be available in sufficient quantities.

MANURES AND FERTILIZERS

A good supply of balanced plant nutrients is essential. Most Indian soils are deficient in nitrogen and organic matter. There are also soils which are deficient in phosphorus, potassium and some of the secondary elements and trace elements. A deficiency in any one will restrict the growth of the plant, and in extreme cases the plant may show signs of malnutrition.

Organic Manures

Organic manures are natural manures made from wastes of plant or animal origin, such as farmyard manure, compost, leaf-mould and activated sludge. Oilcakes are very good sources of organic nitrogen and are excellent for roses. Bonemeal, a slow-acting source of phosphorus, is also very useful in rose culture. One can also practise green-manuring by growing a crop and burying it in the soil before the stems get too tough. Suitable plants for this purpose, in India, include sunnhemp (*Crotalaria juncea*) and *dhaincha* (*Sesbania cannabina*). In tropical soils the organic matter or humus, an important ingredient of a fertile soil, tends to get 'burned out', and it is necessary to renew it by adding organic manures, which not only supply plant nutrients but also help to maintain a good structure in the soil, which will permit the movement of air and water, and also the growth of beneficial micro-organisms.

The best time to add organic manure is at the pruning time. A little of the soil around the base of the rose plant is removed to make room for the addition of the manure. It is advisable to see that the manure is well rotten and matured to prevent the danger of White Ants. Poultry- and pigeon-manures are highly concentrated, and horse-dung is 'heating'. After manuring, the plants should be watered well.

At the time of pruning and before adding organic manure, some people in India remove enough soil to expose the upper roots, and leave the plants in this condition for several days in the belief that exposure to air and light will destroy pests and help the subse-

quent growth of the plant. I have not found any advantage in this method. On the contrary there is a risk of weakening the plants by cutting off some of the roots. In northern India the serious pests and diseases of the rose plant, such as Scale insects and the Dieback fungus, are not eliminated by this practice. It thus appears better to remove only just enough of the top soil to make room for the incorporation of the manure.

Inorganic Fertilizers

More quick-acting than the bulk organic manures, these 'artificial' fertilizers are required in smaller quantities and are very efficacious. The most important are the fertilizers containing nitrogen, such as sulphate of ammonia. Most Indian soils are deficient in nitrogen and respond well to applications of nitrogenous fertilizers. After pruning, when the new growth has started, a pinch of sulphate of ammonia will act as a tonic and give an impetus to growth. A tablespoonful of the fertilizer is enough for a medium-sized plant, and may be sprinkled round in a circle about 20 cm. (8 in.) from the base of the stem. In recent years urea has become available and is a major nitrogenous fertilizer used both in agriculture and horticulture. Urea, however, is a very powerful fertilizer, its N content being as high as 46 per cent. It has therefore to be used with great care. A teaspoonful of the fertilizer is adequate for an average-sized plant. The fertilizer is worked well into the soil with a small hand-hoe, and the plant is then given a good watering. Too strong a dose of fertilizer will damage the young shoots, which will show deformed leaves, or blacken the shoot tip, or may even kill a young plant. It is safer therefore to start with a small dose and repeat the application after 10 days.

Another fertilizer which helps in the production of more and better flowers is superphosphate, which can be applied in small doses when the flower buds first appear. As with the nitrogenous fertilizers, watering should be done soon after the application. Other fertilizers containing phosphorus, such as basic slag, can also be applied. Basic slag, however, acts more slowly and is recommended for acid soils. As mentioned earlier, bonemeal, an organic manure, is also most useful in average soils.

The third of the major elements required by the plants, potash, is generally already available in sufficient quantities in Indian soils. However, in combination with nitrogen and phosphorus, potash may yield useful results in some areas. It is reputed to improve disease resistance and also flower quality. For application to roses, potash in the form of potassium sulphate is to be preferred to potassium muriate.

Many people find it convenient to apply fertilizers in a mixture. To cater for this demand special rose fertilizers such as 'Rose-Mix' are available in the market. For those who wish to make their own, a good and tried mixture containing both organic and inorganic materials can be prepared according to the formula given below:

Groundnut cake	5 kg.
Bonemeal	5 kg.
Ammophos (11 : 48)	2 kg.
Sulphate of ammonia	1 kg.
Superphosphate (single)	2 kg.
Potassium sulphate	1 kg.

For obtaining good results, about 100 g. ($3^1/_2$ oz.) of this mixture can be used per plant. For the tableland area in the Deccan, with conditions similar to those of Bangalore, the following mixture is commended at the rate of 100 g. ($3^1/_2$ oz.) per plant:

Nitrate of potassium	6 parts by weight
Sulphate of ammonia	2 parts by weight
Superphosphate of calcium	16 parts by weight
Sulphate of potassium	8 parts by weight
Sulphate of magnesium	2 parts by weight
Sulphate of iron	$^1/_2$ part by weight

In this region, manuring with equal parts of horse-dung and red earth 15 to 20 days before pruning is also advocated. Also, bonemeal is applied at the rate of a handful for each square metre. When flower buds have formed, liquid manure prepared from gingelly (sesamum, or *til*) oilcake is also given to the rose plants by some growers.

In certain areas, there may be a deficiency of iron, magnesium, manganese or boron, which are required in traces. Chelated compounds of iron, magnesium and manganese are available in the market to meet such requirements. These are also helpful in bringing out the full colour of the flower.

Deficiency Symptoms

The rose is known to suffer from a number of nutrient deficiencies. A simplified guide to the important nutrient-deficiency symptoms is given below:

Nitrogen: The leaves are usually small and pale green. The lower leaves turn yellow but do not drop off. In some cases there are red-tinted spots on the leaves.

Phosphorus: The symptoms are the dropping of mature foliage, weakened stems and an ill-developed root system.

Potassium: The symptoms show up in the form of brown patches developed around the leaf margins, resulting in marginal leaf scorch.

Magnesium: The centres of the leaves become pale, and areas of dead tissue develop near the midrib.

Manganese: Interveinal chlorosis, with veins remaining green.

Iron: In the just-matured leaves, there is interveinal chlorosis, i.e. the areas between the veins are pale, the veins remaining green. The younger leaves are more chlorotic, lacking the green matter, chlorophyll. With iron deficiency, as distinguished from manganese deficiency, even the very fine network of veins remains green.

Boron: The meristematic, i.e. the young growing, tissues are affected. The terminal buds die, resulting in excessive branching.

Lack of oxygen can also produce chlorosis, and several virus infections quite often produce symptoms which are very much similar to the deficiency symptoms described above, thus complicating the diagnosis. It is indeed only by long experience that one can be reasonably sure of the diagnosis.

FOLIAR FEEDING

Of late, the application of plant nutrients to the foliage through sprays as a supplement to soil application is gaining popularity. Under certain adverse soil conditions, e.g. acid and alkali soils which fix soil-applied nutrients into a comparatively non-available form, foliar application of nutrients proves to be a more efficient way of supplying the nutritional requirements of the plants. It also effects considerable economy in the amounts of fertilizer mixture used for obtaining results comparable with those obtained from soil application. In applying nutrients through sprays, it is necessary to see that the concentration of the nutrient in the solution is not high enough to cause the burning of leaves. It will assist coverage, particularly of glossy and waxy leaves, if a little spreading agent, e.g. Lissapol (I.C.I.) or Dreft, is used to reduce the surface-tension of water. For the supply of major nutrients, the use of 2.5 g. of a mixture of urea and potassium dihydrogen phosphate, mixed in equal proportions by weight and made up to a litre of solution, is recommended (4 oz. in 10 gallons). Equally good results can be obtained by using ammophos (11:48) and potassium nitrate mixed in equal proportions by weight, and applying the mixture at the rate recommended above. Such nutrients should be sprayed very early in the morning, preferably before 8 A.M., on a clear day. In many areas where trace-element deficiencies are suspected, it will also be worth while to supplement the major-nutrient spray with a spray mixture of the following trace elements: Manganese sulphate 15 g. (8.4 drams), magnesium sulphate 20 g. (11.2 drams), chelated iron 10 g. (5.6 drams) and borax 5 g. (2.8 drams), applied at the rate of 2 g. per litre (5 drams per gallon), along with the spreading agents.

WHEN TO WATER ROSES

Roses do not like water standing at the roots. At the same time the soil should not be allowed to dry out to the extent that the plant begins to wilt and show other distress symptoms such as drying of the leaves. The frequency of watering depends on a number of factors such as the nature of the soil: if it is light and sandy it will dry

fairly quickly; if it is clayey it will retain moisture much longer. Again, if a watering-can is used, the frequency of watering should be more than when a good soaking is given with a hose-pipe. In the latter case, it is essential that a bunch of leafy twigs or any other suitable material such as a piece of alkathene or polythene should be used to break the force of water; otherwise the soil gets scoured at the point of contact, leaving a small pit.

Under conditions similar to those of Delhi, which has loamy, alluvial soil, it is usually sufficient to water the rose beds once a week in summer, allowing the water gradually to fill the whole of the bed. In the rainy season, necessary adjustment will have to be made depending upon when the showers are received. If the beds are low and water stands, arrangement must be made quickly to drain away the water by cutting a small channel at a suitable spot. In winter, at Delhi, a good watering once in a fortnight will suffice. When the top soil dries in between waterings, it is useful to stir it up with a hand-fork. This not only helps to remove weeds but the layer of loose soil thus created also prevents the rapid evaporation of moisture.

Watering Pot Roses

For roses growing in pots, the schedule of watering is different. Since pots hold only a small quantity of soil which is not in direct contact with the soil of the earth, moisture tends to be lost rapidly. In warm weather, daily watering is a necessity. At other times, discretion is to be used.

If the leaves of an established potted rose plant turn yellow in spite of adequate watering, the drainage hole at the bottom should be examined to see that it is not choked up. Roses do not tolerate the lack of drainage and quickly show up a distress signal.

Spraying

At times when there is lot of dust on the plants, occasional watering over the top of the plants with a watering-can, or from a hose-pipe to which a nozzle has been attached to create a spray, is very beneficial. This not only makes the plants look clean but the leaves can carry out photosynthesis more efficiently.

CHAPTER 8

PRUNING

PRUNING is practised mainly for two reasons. First, it facilitates the removal of weak, twiggy and spent branches, and shortens the stronger stems, stimulating the plant to produce new vigorous growths capable of giving better flowers in generous quantity. Secondly, it is a means to regulate the size and shape of the plant and to keep it within bounds. If the plant has been properly pruned, there will be a well-balanced arrangement of the canes or stems, with the flowering branches going upward and outward, thereby ensuring plenty of light and air at the centre.

Time of Pruning

In Europe and America, and in other areas with freezing winters, pruning is generally done after the dormant winter period. In spring there is relatively little risk of damage by frost to the new growth stimulated by pruning. In the greater part of India, pruning is usually done just after the monsoon is over. The best flowers are normally produced during the cool winter months, and pruning after the end of the rainy season helps the plants to give of their best. A rosarian in Bihar recommends pruning just before the monsoon starts, apparently on the reasoning that the hot dry spell preceding the rains is the period of greatest stress for rose plants and thus comparable with the winter period of colder countries. However, the difficulty in accepting this suggestion is that the rose blooms produced in the prevailing conditions of high humidity and high temperature are not of the quality produced in winter, and the full benefits of pruning are therefore not realized.

As mentioned in the previous paragraph, pruning is usually done soon after the monsoon is over. In areas with a climate like that of Delhi, the first fortnight of October is usually considered to be the

best for this purpose. The second week of the month, i.e. starting on October 8, is particularly suitable for general garden purposes. It would also allow those who are proposing to compete in the Winter Rose Show of the Rose Society of India, which is usually held about the middle of December, to have available a sufficient number of blooms at the right stage. If one has a large number of plants, one could start a few days earlier and carry on until about the twentieth day of the month. Pruning after that will mean that the flowers will be obtained quite late. The reason for trying to get rose plants to bloom during December is that the days are no longer very hot and the blooms are not damaged quickly by the heat of the sun. The nights also are usually not sufficiently cold to affect adversely those varieties whose flowers cannot withstand very low temperatures. At this time of the year, blooms will stay fresh on the plants for a longer period; there is also a period towards the second half of February which is likewise quite suitable. But at that time many rose plants will not be in bloom, though there is a relatively small flush which starts about the third week of February.

In October, however, there is a great hazard of plants being damaged by the Dieback disease. The soil, which has become water-logged during the monsoon, is trying to give up its moisture, and it is important to see that pruning is done, as mentioned later, with a clean pair of secateurs, and a protective paste or lotion is applied to the cut ends.

Frequency of Pruning

Pruning should be done once a year, as more frequent pruning tends to weaken the plant. However, the flower should be cut off with a sufficient amount of the stem, as this helps to keep the plant neat and ensures that the new shoot will not be weak.

In the Bangalore area, where the climate is salubrious all the year round, pruning is done twice in a year in relation to the two Flower Shows, which are held in January and August. The Hybrid Teas are pruned 42 days before the due date of the Show. The Floribundas get this treatment about 45 days ahead; they are allowed three days more because of their flower clusters.



42. 'Blue Moon' (H.T.)
One of the most satisfactory of the lavender-lilac group. Delightfully fragrant.



43. 'Maharani' (H.T.)

This large-flowered, shapely pink variety was raised from naturally cross-pollinated seed of the very old garden rose 'President Macia'.



44. 'Ratnaar' (H.T.)
Well-shaped lilac-pink flowers are borne on a vigorous plant.



45. 'Rajhans' (H.T.)

Seemingly wrapped in fine tulle, this majestic rose, bred in India, opens out slowly from large shapely buds to very large, very double white flowers. One of the most sweetly scented white roses of the world.



46. 'Apsara' (H.T.)
The exquisite flowers, borne one each to a long stem, owe their luminous "porcelain-pink" colour to the seed parent, 'Sonia'.



47. 'Royal Highness' (H.T.)

It is about this classically-shaped, soft light pink rose that a devotee of this beautiful variety in America wrote: "Its flowers are fit to be placed in silver vases before an altar".

48. 'Confidence' (H.T.)

Pearly light pink on a light yellow ground, the very large, well-shaped blooms can win blue ribbons in shows. Often not at its best in Delhi's cold weather, it can be seen in its glory in western India.



49. 'Double Delight' (H.T.)

Large, high centred creamy-white flowers become strikingly edged with rich strawberry-red which tends to spread. Unusually strong spicy perfume. One of the world's favourite roses, it is also performing well in India.

Pruning-Tools

Most people use secateurs for pruning and they are available in a variety of shapes and sizes. The edges of the secateurs should be kept sharp so that a clean cut is made and the plant tissues are not bruised or lacerated. When the secateurs are not required for a long time, a drop of oil or a little of vaseline will help keep them in good condition.

Pruning can also be done with a knife, and special pruning-knives are available. In fact knife-pruning is preferred by experts since a cleaner and smoother cut can be obtained than that with a pair of secateurs. However, it requires practice and should not be tried straightway to the ruin of some of the best bushes. For pruning thick woody branches it is necessary to use a small saw.

Light or Heavy Pruning?

This is a subject on which there has been considerable controversy. Some rosarians favour severe pruning, cutting back the branches so as to leave only two to three eyes on each stem. Others, however, recommend only a high pruning, i.e. a light tipping of the bushes. Heavy pruning will of course tend to give larger blooms but fewer of them, and it should be understood that drastic pruning robs the plant of the food it has stored and may ultimately shorten the life of the rose plant. Actually, the amount of pruning to be done will vary with the type of the rose, the variety and the local climatic conditions. Generally, moderate pruning is the safest course to adopt.

General Rules for Pruning

Before giving information on the methods of dealing with the several classes of roses, it is well to stress a few basic principles of pruning. These are:

1. Remove all dead branches and portions of branches.
2. Remove all parts which obviously show signs of infestation by insects or any disease infection.
3. Remove the weaker branches if the bush is crowded.
4. Remove all suckers which may have grown from any portion of the stock.

5. Always make a sharp cut at an angle of 45 degrees, about 5 mm. (¼ in.) above a strong healthy eye (Fig. 3).

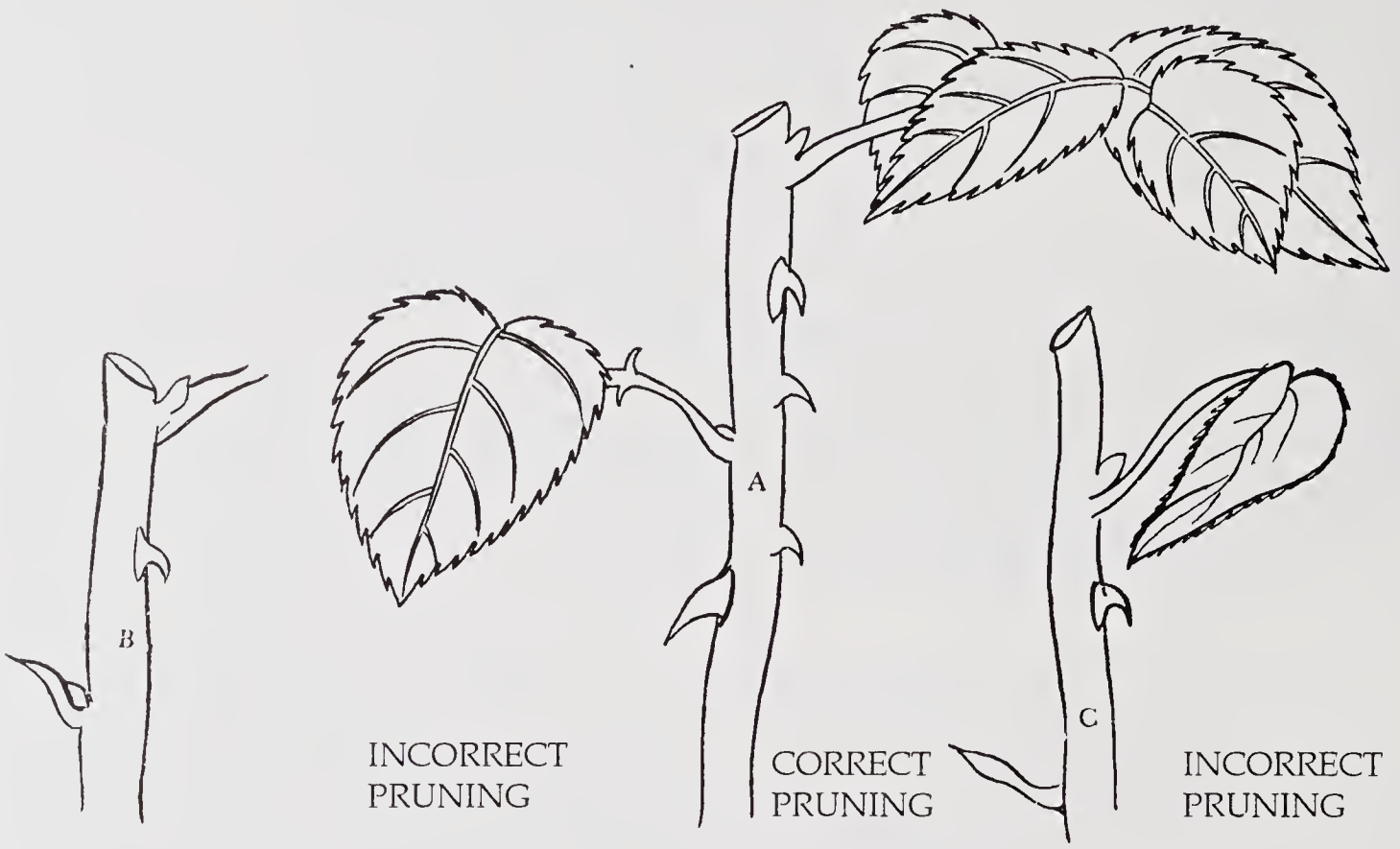


FIG. 3. Correct and incorrect pruning

Pruning the Hybrid Tea Roses

In Delhi the best time for pruning the Hybrid Tea roses is the week starting on October 8. This will bring a fine flush of bloom starting in late November and lasting for four to six weeks. If the number of bushes is large, pruning will extend over many days. In that case, a start should be made with varieties whose flowers are liable to be damaged by the cold nights in the second half of December, such as 'Toro', 'Blue Moon' and 'Memoriam'. Those which appear to revel in the cold weather should be kept for the last. This category includes 'McGredy's Sunset', 'Molly Sharman-Crawford'* and 'Ena Harkness'. There are also a few varieties like 'American Heritage' which do not open in such weather and do not suffer petal injury, but they lose a good deal of their colour. In the case of roses planted for exhibition purposes, it is advisable to have several plants of each of the favoured varieties and to 'stagger' the

* This is a Tea rose.

pruning over a period of a week in order to improve the chances of getting choice blooms at the right stage of development on the day of the Show. If pruning is done early, many of the best blooms will be over before the day of the Rose Show. On the other hand, if you delay too long you may find yourself surveying a panorama of unopened buds on the fateful day!

The weak, twiggy branches and diseased shoots should be cut out. It is normally advisable to keep all the strong healthy canes. These should be cut back to about one-half of the growth made in the preceding season. There is no hard-and-fast rule about this and experience will show how to deal with various varieties. Varieties growing vigorously usually need less cutting back than the weaker sorts, which need the stimulus of rather severe pruning. However, some varieties resent hard pruning, and in these pruning should be limited to cutting off old flowers and removing diseased and extremely weak branches. 'Frau Karl Druschki' (also called 'Snow Queen'), 'Crimson Glory' and 'The Doctor' belong to this group.

If roses are grown for exhibition purposes, it may be necessary to reduce the number of branches so that the nourishment available to the plant may be concentrated on the three or four stems which will bear specimen blooms. In these cases disbudding will also be necessary in varieties which tend to produce more than one flower on a stem.

Pruning the Floribunda Roses

The very word 'Floribunda' implies an abundance of flowers, and it is a poor variety of this class which does not live up to its name. The pruning of the Floribunda roses has to be different from that of the Hybrid Tea varieties. It is necessary only to remove all weak and diseased growth, and also the ends of branches which may have got lost in a maze of twiggy growth.

In the first season, however, the plants may be pruned as for the Hybrid Teas to encourage strong healthy growth from the base and to regulate the shape of the bush. Thereafter, pruning should be light, as indicated in the preceding paragraph. It may be sometimes necessary to remove some of the older shoots from the base to make room for and to encourage new branches. If grown in the form of a

hedge, plants should be trimmed to a uniform height.

Pruning the Dwarf Polyanthas and Miniatures

Both these types need very little pruning. The thinning of overcrowded branches and the 'tipping' of the ends of branches that have already flowered is all that is really necessary.

Pruning the Climbers and Ramblers

The Rambler types such as 'Dorothy Perkins' and 'Crimson Rambler' produce large clusters of small flowers once a year on long vigorous basal canes. The canes that have flowered normally do not bloom again; so they may be removed from the base after flowering. The new growth should be preserved, as this will produce blooms in the following year.

The large-flowered Climbers are a heterogeneous lot and their requirements differ quite a lot from one variety to another. It is advisable therefore to study the plants in the garden to determine which of them bloom on the old wood and which on the new growths. Pruning can then be adjusted suitably.

In the case of the Hybrid Tea Climbers hardly any pruning is required, because it is desirable to promote, as much as possible, the growth of the lateral and sublateral or side-branches, because these will bear the flowers in due course. The Hybrid Tea Climbers produce very few flowers on the very recent growth, and the best flowers are produced on the short branches that emerge from the older canes. Occasionally it may be necessary to cut back the tops or remove some of the canes to make room for new ones.

The Climbing Floribundas and Polyanthas, as well as the Climbing Miniatures, may be treated similarly. The important thing is to remove dead branches and any unnecessary twiggy growth.

Pruning the Standard Roses

The pruning of the Standard roses is essentially similar to that of the bush forms. But it should be remembered that in the Standards the sap has to travel about a metre from the roots to the branches above. The Standards therefore tend to make less growth and hence do not need drastic pruning. But the shape of the plant is specially

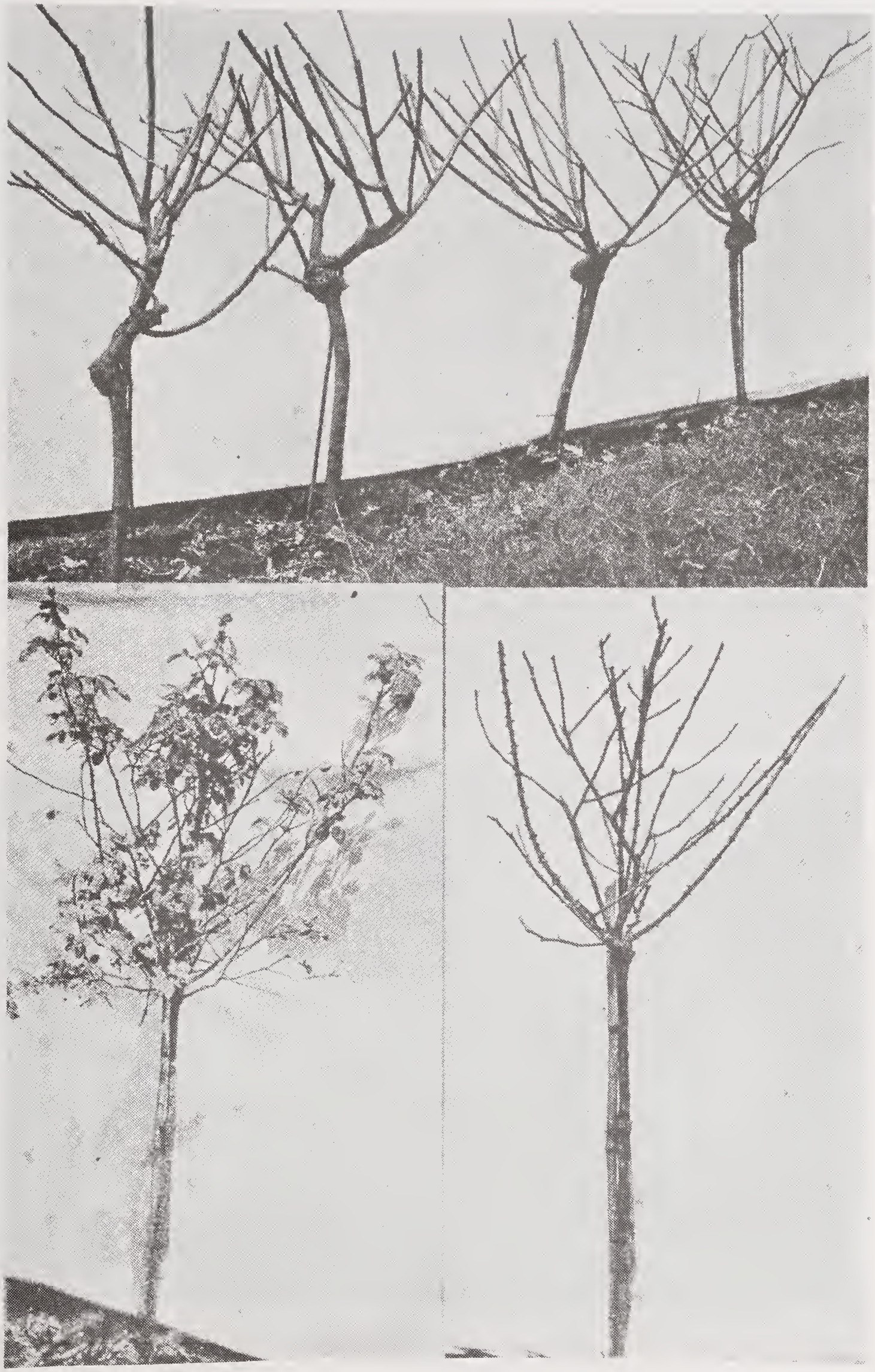


FIG. 4. *Top,* Half-Standards after pruning; *bottom,* a Standard, before and after pruning



50. 'Christian Dior' (H.T.)
Valued for its magnificient, high-centred blooms that open slowly and keep their shape for several days, this variety, introduced in 1958, is still popular in spite of its susceptibility to mildew.



51. 'Frau Karl Druschki' (H.T.)
One of the immortal roses, it produces very large beautifully fashioned blooms tha can win prize in exhibitions even today! Very tall and extra vigorous.

important in this type as a uniform crown growing symmetrically in all directions adds to the beauty of the Tree rose.



CHAPTER 9

PROPAGATION

Roses can be propagated by seeds, cuttings, layers and by budding or other forms of grafting. Breeders grow roses from seeds, especially after making crosses between desirable parents, because this affords the genetic variability required for selecting new varieties. This aspect will be dealt with in a separate chapter on Rose Breeding.

Seeds

In temperate countries seeds of the wild species are sometimes sown to provide the seedlings to be used as under-stocks for budding. In these wild species, fruits, called hips, are produced in great abundance, and because of little or no crossing with other types, the seedlings apparently do not show much variation and are thus suitable for use as stocks. The seedlings do not become ready for budding in the same season.

Cuttings

Some of the more vigorous types of roses can be readily multiplied by means of cuttings. Some of the Climbers and Ramblers, as well as the Polyanthas, respond quite well to this method. For the Miniature roses some people actually prefer this technique to budding, because budding tends to make the plants too large owing to the great vigour of the under-stock.

The most important advantage of this method is that it provides under-stocks, or stocks as they are commonly called, for use in budding.

Layers

Layering is quite convenient for increasing the number of plants of the Climbing and Rambling roses. The technique is similar

to that of preparing layers of other shrubs. Both for layers and cuttings, root-promoting substances available in the market, such as Seradix, may be used, according to the instructions given with each product.

Budding and Other Forms of Grafting

Grafting is the process by which parts of the tissues of one plant are transferred to another after suitable preparation. The object is to enable a variety which is desirable in all other respects to utilize the vigorous growth and particularly the vigorous root system of another, and thus to have plants combining the best characters of both. The variety below, which provides the root system, is called the 'stock' or 'under-stock', while the other, which is grafted on to it and which provides the upper portion of the grafted plant, is termed the 'scion'. There is evidence that certain stocks are more suitable than others for certain regions, and, since the stocks and scion can influence each other to some degree, some scions combine better with particular stocks. This, however, is a subject on which more research needs to be done in this country.

Stocks

In Europe the stocks used include the Dog Rose (*R. canina*) and others such as *R. multiflora*, *R. laxa* and *R. noisettiana* var. *manettii*. For Standards, stocks of *R. rugosa* are popular. In America, besides *R. multiflora*, which is the predominant root-stock in many parts of the country, 'Dr Huey' and 'Ragged Robin' are used in some areas. In recent years extensive trials have been carried out in both Europe and America, and certain stocks have been developed which are claimed to be better than the older ones. Unfortunately these do not appear to be available in our country.

In the plains of India, 'Rose Edouard' is one of the most popular stocks, and for Standards it is probably the best as it provides straight stems of suitable length. In Bihar, Bengal and southern India, and in the hills, a briar type, probably a form of *R. multiflora*, is often used. This is extremely vigorous, and its branches, which tend to develop at each node, require a good deal of desuckering. Some enterprising nurserymen have introduced some foreign stocks, but the results of

the trials are not yet known. The Indian Agricultural Research Institute, New Delhi, after trials has identified a root-stock referred to as *R. indica* var. *odorata*, which is considered to be superior to the ones previously used. This stock, however, has not yet been given a formal name.

Technique of Budding

Budding is generally considered to be by far the most suitable of all forms of grafting for roses. The nurseries in Bengal and Bihar once used to prefer grafting, but there is reason to believe that most of them have taken to budding, the technique of which will be described here in detail. Here are the steps:

1. Having chosen the variety to be used as the scion, look carefully for suitable 'eyes' or 'buds'. These 'buds' are not to be confused with flower buds; they are the growth points, situated in the axils of the leaves, from which new shoots can arise. When a rose plant comes into flower, small swellings are visible between the stem and the stalk of the leaf. Choose 'eyes' which are visibly plump but have not yet started to elongate and grow. Cut off the portions of the branch with the 'eyes' just selected. This is sometimes referred to as 'budwood' or 'budding eyes'. Remove the thorns, preferably by finger pressure, and cut off the leaves, leaving about 2 cm. (0.8 in.) of the stalk in each case; this serves as a convenient 'handle' at a later stage of the budding operation. Do not try to pull off the leaves as this may injure the delicate 'eye'.

2. The next stage is to remove, one by one as required, the 'eyes' which are to be budded. With a sharp knife, preferably a budding-knife, remove a shield-shaped piece of the bark and the 'eye' along with it by cutting into the stem from about 2 cm. (0.8 in.) above the 'eye' to about 1.5 cm. (0.6 in.) below it. The depth of the cut should be just enough to separate the bark from the central woody cylinder. This is the area where the tissue capable of new growth is to be found.

3. The stock should have been made ready. Branches and side-shoots not required should have been cut away, leaving only the stems actually wanted. The latter should be of a suitable diameter; if too thin, they will be difficult to handle, and if too thick, the bark



FIG. 5. Technique of budding

1, Part of the scion with 'bud' and leaf; *2*, 'budwood' with the leaf cut off and thorns removed; *3*, shield-shaped bark with the 'eye'; *4*, 'budding eye' with 'handle'; *5*, T-shaped cut on stock cleared of thorns and leaves; *6*, T-shaped cut being loosened for inserting the 'budding eye'; *7*, 'budding eye' inserted; *8*, tying the 'eye' with a polythene strip; *9*, the 'eye' securely tied

may be very stiff. Generally, if the 'budding eyes' are small, a thinner stock should be used. Conversely, if the 'buds' are plump and well-developed from thick branches, the stock will have to be commensurately stouter. The stock should be wiped clean and the leaves and thorns that come in the way removed.

4. Make a sharp horizontal cut at a suitable height in the stock. Starting from it, make a vertical cut below, so that a T-shaped cut results. The size of this cut should be just sufficient to accommodate the 'eye' of the scion (1 and 2 above). If the cut is larger, the budding operation will be easier, but a larger wound than necessary means a larger area to heal and a greater possibility of infection coming in. The cut should again be made to reach the meristematic layer of tissues between the bark and wood—the cells which are capable of growth and regeneration.

5. Take the 'eye' that is to be budded along with the shield-shaped tissue attached to it. After trimming slightly if necessary, gently lever it into the T-shaped cut in the stem of the stock. The 'eye' should point towards the top. The little bit of the leaf-stalk which was left when taking out the 'eye' from its parent shoot will be useful in this delicate operation. If any bit of tissue from the 'shield' protrudes, it should be cleanly snipped away.

6. Tie the 'eye' in place with raffia or other suitable fibre. Nowadays narrow tape-like strips of synthetic polythene or alkathene fibre are also quite widely used. Special bands of 'budding rubber' are also widely used by professional nurserymen in Europe and America.

7. Generally it is advisable to do the budding as low down on the stock as convenient. In cold countries subject to severe frost and snow in winter, it is customary to try and do the budding between the roots and the first branch on the stem. In the greater part of India, it is not necessary to do budding quite as low. It is certainly much more convenient for an average person to bud a little higher up, though not too high.

8. One bud on a stem is usually considered sufficient, though some people keep two or even more on the same stem, at little distances from each other, in order to try and get more growth rather quickly.

9. The best time for budding around Delhi is from the end of October to early March. In places with a mild climate all the year round, like Bangalore, budding can be done at almost any time. In other areas it is best to follow the local practice. However, if there be no precedent in a new area, choose a season that is not too hot or cold or too wet. Even in areas like Delhi the season for budding can be prolonged, for instance, by arranging to shade the budded plants when the sun is too hot, and by budding 'eyes' only on the side of the stem away from the sun. Generally, late afternoon is a good time for budding in regions where the days are hot, so that the new grafts get the benefit of the cool night immediately following the operation.

After-Care

After the budding operation, when the 'eye' shows signs of swelling, the top part of the stock above the point of union may be cut off. Until this time, however, it is advisable to retain it so that the flow of sap to the growing point does not stop. When the successfully united 'bud' begins to grow, it is important to gently remove the fibre, polythene or rubber band which was tied round the stem to keep the 'bud' in place. Otherwise, since the stem keeps growing, there will be strangulations at the point and the scion will be adversely affected. Generally, under the conditions prevailing in Delhi the bands should be removed about three weeks after budding.

'Suckers' or branches of the stock should invariably be removed as soon as they show themselves; otherwise they will deprive the young growing scion of its due nourishment. Newly budded plants also tend to rush into bloom. All flower buds should be removed, as soon as they are clearly visible, by a nipping movement of the forefinger and the thumb, until the budded plant attains reasonable size and vigour.

Although budding may appear to be a complex operation, in reality it is quite simple. With a little practice, even the amateur can achieve very satisfying results.

The Polybag Method

In recent years, particularly in the Maharashtra region, a

method of propagation known as the Polybag method, introduced by N.A. Joshi, has come into vogue as a method for the easy and rapid multiplication of rose varieties. In this method, bags made from thick plastic polythene are filled tightly with fine sieved soil and placed close together in beds and given a thorough watering after which cuttings of the root-stock are inserted. A suitable rooting hormone like 'Seradix B-2' or 'Karadix' is applied to the bottom of the cuttings before they are inserted into the soil. In places like Pune, such cuttings become suitable for budding 4 to 7 weeks from the date of insertion. This method appears to be becoming popular.

Do Roses Run Down?

There is a feeling among some people that any plant which is continuously propagated vegetatively by cuttings, layers or grafting eventually loses its vigour. Scientific research has failed to confirm this. Unless a plant becomes infected with a virus disease, or it has mutated or sported for some character or characteristics responsible for the vigour, or the 'constitution' of the variety as it is sometimes termed, no deterioration need be expected.

How Long Can Rose Plants Last?

The great rose bush at Hildesheim Cathedral in Germany is regarded to be more than 1,000 years old, and several rose shrubs and climbers in Europe and America are said to be of considerable age. In a temperate climate Bush roses are generally considered to be garden-worthy for 30–40 years. In our climate, where they do not get the yearly rest in winter, they can be counted on for about 10 years. However, this will depend on the particular variety, and of course on the care that is given to it.



52. 'Garden Party' (H.T.)

The high-centred and well-shaped flower with large, flaring outer petals give it size and dignity. Flowers freely.



53. 'Happiness' (H.T.)

Large, full and well-formed flowers with reflexing petals are borne on long stems, and produced freely on a vigorous bush.



54. 'Brandy' (H.T.)
Long buds of luscious burnt-orange open out to huge-flowers of rich golden apricot. Unlike many in this colour range, the plants are vigorous. A splendid variety.



55. 'Homage' (H.T.)

A large, shapely, attractive pink rose derived from a cross between 'Princess Margaret of England' and 'Sonia', two fine roses located by Meilland in France.



56. 'Nishada' (H.T.)
Very long and large bud and flower in an orange-pink blend. Very fragrant.



57. 'Dil ki Rani' (H.T.)

The Indian name means 'Queen of the Heart'. Very long, very shapely flowers of a lovely pastel pink. An offspring of that fine rose, 'Sabine'.

58. 'Chambe di Kali' (H.T.)

The maidens of the Himalayan valley of Chamba have been known for their beauty, and this variety is named in their honour. Beautiful sparkling pink buds are borne on strong shoots with glossy leaves.



59. 'Raja Surendra Singh of Nalagarh' (H.T.)
(Registered as 'Raja of Nalagarh')
Glowing orange-salmon flowers of good shape are freely produced on long straight stems. Named after one of the great rosarians of northern India.



60. 'Lady Grade' (H.T.)

Attractive, large, well-formed flowers are produced freely on a vigorous bush. A rose from England, it has the famous 'Super Star' as the seed parent.



61. 'Korantel' (H.T.)
Large, full flower of golden yellow, edged and marked with orange-pink. Dazzling colour.

CHAPTER 10

PESTS

LIKE any other plant, the rose has its own enemies, some of which assume more serious proportions in one part of the world than in others. The present account is confined only to pests that become troublesome from time to time, particularly in northern India.

The majority of the rose pests are not specific to roses and they attack and feed on quite a number of plant species besides the rose. This habit makes it rather difficult to ensure the complete safety of the rose when there is so much vegetation in the vicinity which is less cared for and can harbour these pests. All the same the lovers of the rose need not be dismayed, because with the present knowledge it is possible not to allow the pest problem to become a serious obstacle to the maintenance of a beautiful rose garden.

White Ants

The Termites (Fig. 6), or White Ants as they are commonly known, are particularly destructive to rose cuttings before they are able to establish themselves well. These harmful insects have a very complicated and peculiar mode of underground existence. They are highly evolved social insects with well-organized colonies, wherein there is a perfect division of labour among the different castes of individuals, each of which has a set kind of duties to perform. They construct different types of nests at various depths, and it is the 'workers' from the nests that come out and forage for long distances and damage the newly planted rose beds. The main difficulty in the control of this pest is that even if the batches of White Ants that visit the rose beds are killed by some method, their permanent source, the nest from which they come, remains practically unaffected. Despite this limitation the experience is that if the soil within the pit is treated with a suitable insecticide before planting, the damage is apprecia-

bly reduced. For this purpose, before planting roses the soil in the pits should be treated with 5 per cent Aldrin dust or Phorate 10 G granules at the rate of about 3 g. per pit. This will also afford protection against the white grubs of Chafer Beetles, dealt with below.

Chafer Beetles

Particularly during the monsoon season, the rose leaves begin to show irregular cuts and punctures and in some years the rose beds get badly defoliated. Yet no culprit is seen doing this havoc unless the plants are examined during night-time when quite large-sized (9–12 mm. by 5–6 mm.) reddish-chestnut-coloured beetles can be seen voraciously eating the rose leaves. These are commonly known as Chafer Beetles (Fig. 13).

Although some species are known as Rose Chafers, practically all of them are polyphagous and are known to feed on a variety of plants like grape-vine, guava, loquat and *phalsa*. They lay eggs in the soil, where their larvae grow into quite large-sized flesy-white grubs, which destroy the roots of as many plants as are defoliated by their adults. Also, adults are not bad fliers. This kind of polyphagous habit both during the adult and immature stages makes it difficult to ensure the safety of any particular rose bed from damage unless large-scale control measures are adopted over large areas. All the same, the damage can be kept considerably reduced by carrying out the following recommendations.

(a) While carrying out earthing, or any other soil operation, the white grubs should be carefully picked out and destroyed. The infected area can be treated with a good soil insecticide like Phorate 10 G or Quinalphos 5 G granules at the rate of 1 kg. of active ingredient per hectare (400 g. of active ingredient per acre).

(b) The plants should be sprayed with 0.1 per cent Malathion or Fenitrothion. This treatment need not be repeated at less than two-week intervals, unless there has been a heavy downpour of rain. The insecticide kills the beetles which alight and feed on the treated plants. With each spraying, the injury gets reduced, unless the treated area is insignificant when compared with the untreated area in the vicinity.

(c) When the number of plants is small and the damage by Chafer Beetles is expected to be severe, one can definitely ensure the protection of the valuable plants by bagging them at night and removing the bag in the morning. This is particularly advisable in the case of freshly budded plants whose growth is considerably retarded on account of the damage caused by these beetles.

Red Scales

These insects look like reddish-brown waxy scales. At times they cover the tender shoots in large numbers, disfiguring, like pox marks, the normal healthy look of the rose plant (Fig. 9). Each scale represents an individual insect, which, after roaming about for a very short period in its youngest stage, has settled practically permanently on its site. The insect keeps its piercing mouth-parts thrust into the plant tissue and sucks out the plant sap for its nourishment and growth. Owing to continuous draining of the food resources by thousands of individuals, the plant succumbs in cases of severe infestation.

A few points regarding the method of propagation of this pest are both interesting and important for the lovers of roses. The female Scales are comparatively large and more or less round, whereas the males are rather longish. From each of the male Scales, in the spring of every year, a small winged insect emerges and moves about to fertilize the mature, round, female Scale insects, which remain wingless throughout and do not at all move from the spots at which they have settled. Each one of these fertilized female Scales produces a number of young crawlers, which go on to portions of fresh growth of the rose twig and once again start the nefarious activities of their parents. At this stage the crawlers can also move on to other shoots of the same or adjacent plants either by physical contact between the twigs or when blown off by wind. All the same, the rate of dispersal of this pest is lower than that of other winged insects.

In Delhi fresh infestation of the Red Scale starts during March–April. Later this activity gets considerably reduced owing to the intense heat of summer, which kills the majority of the Scales. However, enough of the population escapes destruction, particularly in shady places, and a fresh cycle of activity starts in

August–September and continues till October–November.

From the foregoing account one may expect that it should be quite easy to keep one's small rose garden completely free from this pest, specially because the insects are primarily stationary. The main reason why this expectation is not fulfilled is that the pest is not specific to roses, and is known to attack 86 species of plants, the important ones being apple, banana, citrus, coconut, fig, grape, loquat, mango and mulberry. Hence when a large number of perennial plants are also present, it is practically impossible to disinfect the garden completely of this minute insect.

But the following control operations can keep the rose plant reasonably free from this infestation.

1. When there are only a few plants to be taken care of, the Scales can be mechanically crushed or treated in the evening with a swab of cotton or piece of sponge dipped in methylated spirit. This has to be done repeatedly to get satisfactory control. A much better alternative is to treat the plant with a suitable insecticide. Diazinon, Fenitrothion, Malathion, and Monocrotophos are insecticides which are quite toxic to this pest and give excellent results under field conditions. Since these pesticides are also toxic to animals and men, they should be used with great care. Under no circumstances should these chemicals or any instrument or container used for their application be left in untrained hands. These insecticides could be applied to the plants by gently rubbing the affected part with an old, out-of-use tooth-brush dipped in the insecticide (see tabular statement on p. 157). This is a very effective treatment and practically 'clears up' the plants. However, all precautions indicated by the manufacturers and formulators of the pesticides should be strictly followed.

2. In large-scale plantations the insecticides should be carefully applied as sprays, first soon after pruning and for the second time during March–April, when most of the crawlers have been produced.

3. At the time of pruning, the infested twigs should be collected and burnt.

Aphids

The attack of Aphids, or Plant Lice as they are commonly called,

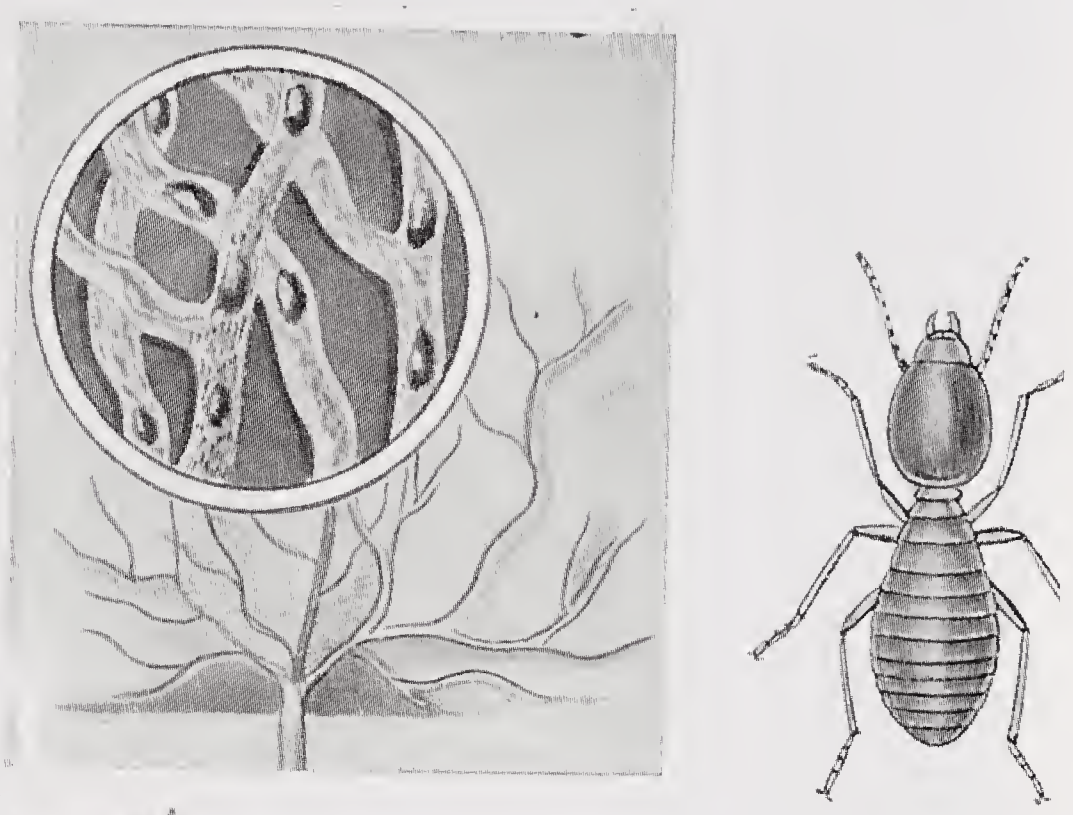


FIG. 6. *Left,* roots damaged by White Ants; *right,* a White Ant enlarged (actual size, 0.25 cm.)

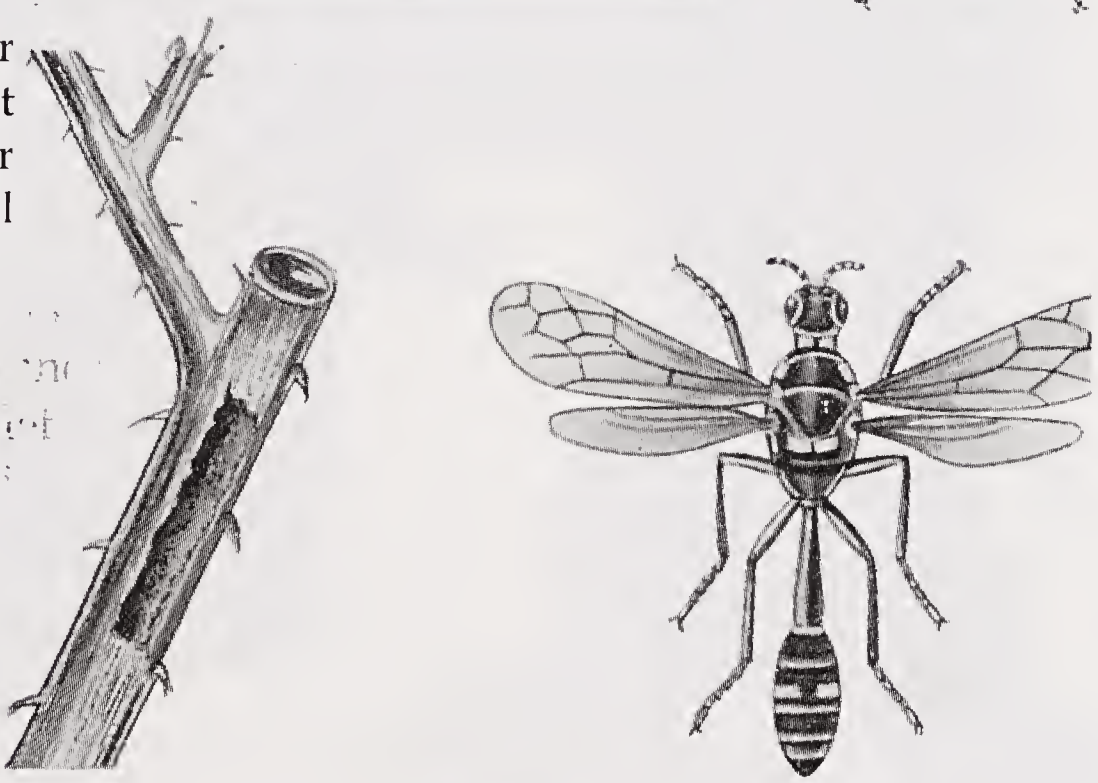


FIG. 7. *Left,* nest of Digger Wasp excavated at the cut end of stem; *right,* a Digger Wasp enlarged (actual size, 1.5 cm.)



FIG. 8. *Left,* blotching of leaves by Mites; *right,* a Mite very highly magnified (actual size, microscopic)



FIG. 9. Scale Insects on rose stems (magnified)

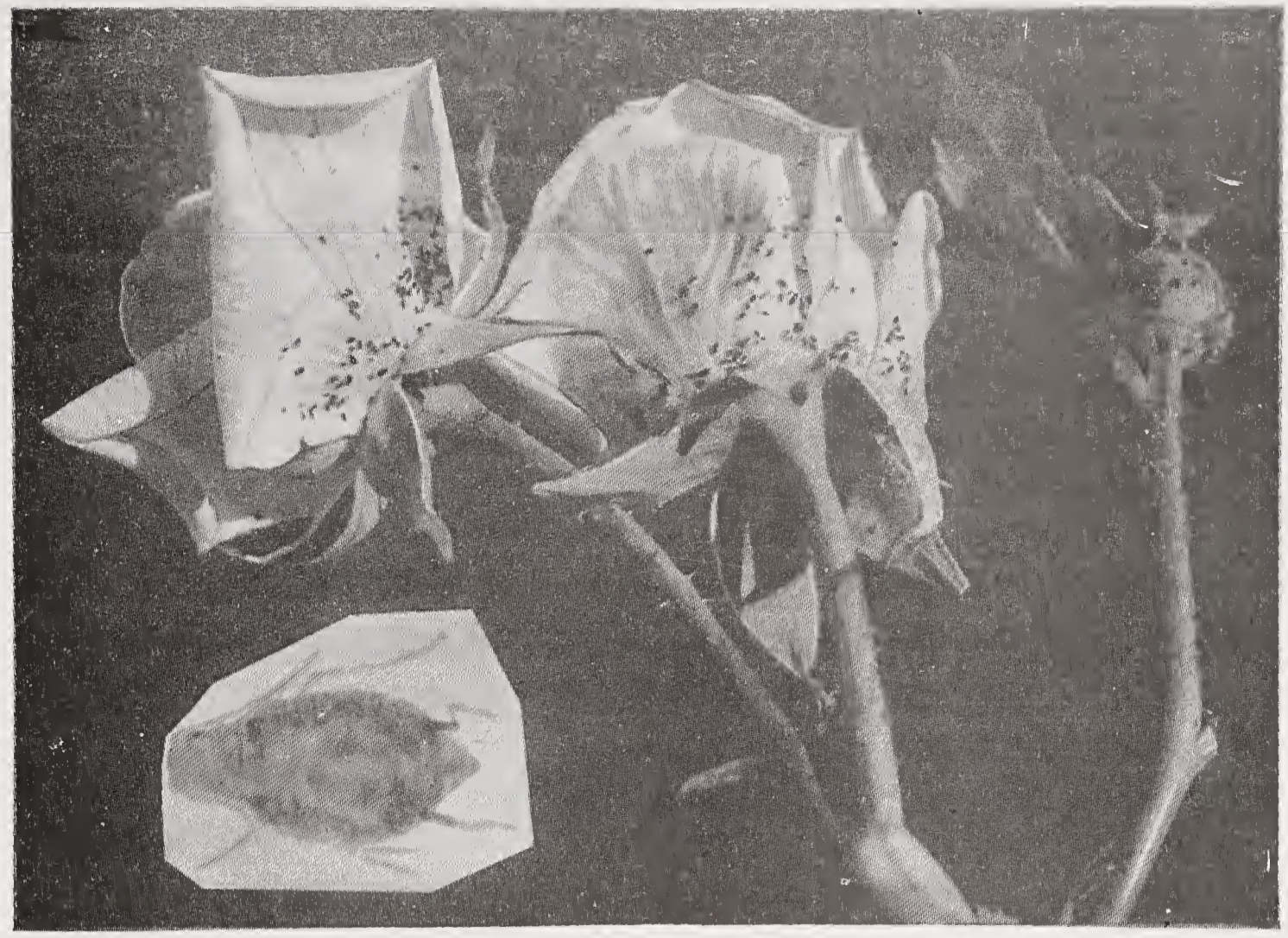


FIG. 10. Colonies of Aphids on petals and buds; *inset,* an Aphid highly enlarged (actual size, pin-head)



FIG. 11. Yellowish-white patches on leaves, caused by Jassids; *top,* a Jassid highly enlarged (actual size, pin-head)



FIG. 12. Rasped and distorted leaves with black spots owing to injury caused by Thrips; *top,* a Thrip highly enlarged (actual size, pin-head)



FIG. 13. *Left,* a Chafer Beetle (actual size, 11 mm); *right,* rose leaves showing irregular cuts and punctures

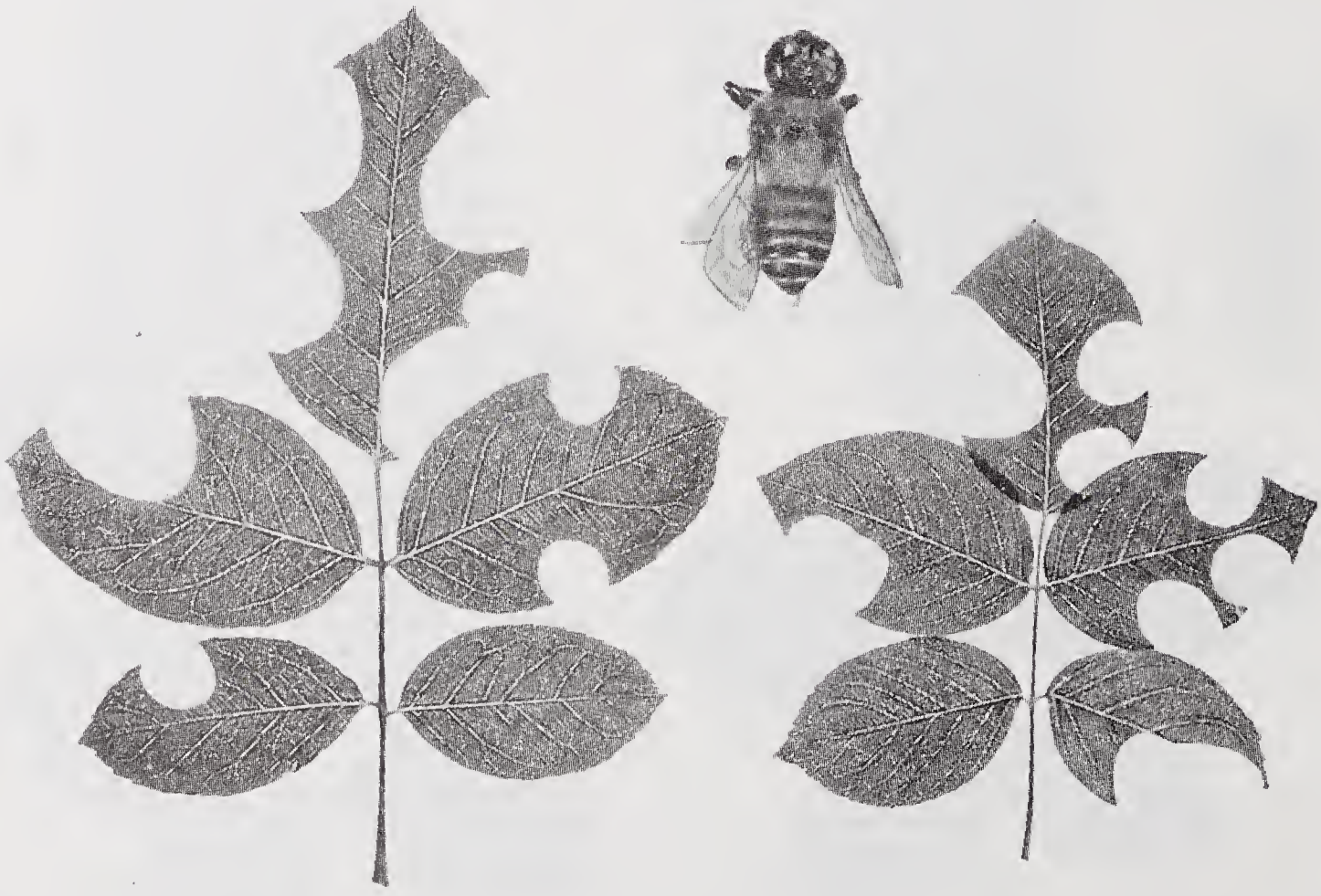


FIG. 14. *Top,* a Leaf-cutting Bee; *bottom,* leaves showing characteristic, neat, circular or oval cuts near the margins

is more easily discernible than that of Thrips. These are minute but quite prominent, more or less globular, light-green to deep-green and blackish-green insects. They occur in clusters on tender shoots, buds and flowers (Fig. 10) and to a less extent on the underside of leaves. More than one species of Aphid attacks the rose plant, and some of them attack several other plants besides the rose. In Delhi the attack is generally noticed during January–February.

Aphids, like Red Scales, suck out the plant sap but they do not remain stationary. The Aphid makes a fresh puncture every time it has to feed. Thus one individual produces a large number of wounds. The vitality of the affected shoot gets very much sapped, while an attack on the flowers mars both their beauty and the lasting capacity.

The insecticides suggested for the Red Scale and the Thrips will certainly kill the Aphids. But when Aphids attack very tender shoots and flowers, one should be more careful and not take the risk of even the least harm to the tender shoots which are to flower shortly, or to the flowers themselves. Hence it is best to use the most harmless insecticidal dust based on an extract of pyrethrum flowers. The preparation commonly available in India is sold under the proprietary name of 'Pyrodust', and a light application of 0.2 per cent 'Pyrodust' on the infested plants kills the Aphids quickly. Of course, it has to be repeated as and when the trouble reappears.

Jassids

Roses are attacked by tiny insects commonly called Jassids or Leaf-hoppers. They are small light-grey or pale-green insects with wedge-shaped wings and often become abundant during April and May. They suck the cell-sap from the leaves. The loss of plant juice causes the yellowing or whitening of the upper surface of the leaves (Fig. 11). Plants situated in shady places are attacked more.

The young ones, which are wingless, suck the sap from the plants and cause damage similar to that caused by the adults. The damaged plants have a sickly appearance. These insects are very active and even with slight shaking of the plants they try to hide themselves in the nearby vegetation.

Jassids can be easily controlled by spraying with 0.1 per cent

Malathion. Other chemicals which can be tried are 0.1 per cent Diazinon or 0.1 per cent Fenitrothion. Care should be taken so that the insecticides do not come into contact with the skin. As the insects also feed on various trees like peaches and bushes like Bougainvilleas, the latter should also be sprayed, if they are located near the rose plantation.

Thrips

Sometimes rose plants begin to lose their healthy look owing to the distortion of leaves which are found to bear brown patches and also show signs of fading. When the underside of these leaves is carefully examined, one finds small groups of minute elongated insects, commonly known as Thrips (Fig. 12). There are also some characteristic minute black spots of the excreta of the insects. These insects have peculiar rasping mouth-parts, with the help of which they damage the undersurface of the leaf and suck the sap oozing from the wounds. The insects also enter the developing rose buds and feed on the tender parts resulting in petals being flecked and discoloured. The buds may even fail to open, the flowers remaining balled, with the edges of the petals brown. When the attack is very severe, the young shoots become black with badly deformed leaves. The injury not only produces all the ugly symptoms mentioned above but also adversely affects the physiological state of the plants and their flowering potential.

This pest remains active from March to November, during which period it produces several generations. From November to March it over-winters in the soil in its pupal stage. Unlike many other groups of insects, it inserts its eggs within the leaf tissue, wherefrom the young ones hatch in three to eight days, depending on the prevailing temperature.

The pest occurs throughout India and attacks a number of plants besides the rose, some of the important hosts being grapevine, mango and pomegranate. This makes it difficult to ensure complete freedom of rose beds from this pest. However, the control of this pest is easier than that of the Red Scale as this insect is quite susceptible to a large number of insecticides. The spray suggested for the Red Scale will certainly kill the Thrips also. In this case,

however, particular care should be taken so as to ensure that the undersurface of the leaves receives full coverage. It is advisable to repeat the treatment after a week, so that the young ones subsequently hatching from the eggs embedded in the leaf tissue may also be killed and a quick rebuild of the population may be considerably delayed, if not avoided altogether. When only a few plants are to be taken care of, the insects can be killed even mechanically or by the application of the insecticide with a brush to the affected leaves.

Leaf-cutting Bees

Leaf-cutting Bees are hairy, medium-sized dark insects with the base of the abdomen tinged with red-brown. They build mud cells in crevices and cavities in hedges, dead wood and in neglected dwellings.

Leaf-cutting Bees cause characteristic damage to the rose leaves, by cutting neat, circular or oval patches from the leaf margins (Fig. 14). The cut bits of leaves are used in their nest cells. The nest cell is provided with pollen paste, and one egg is deposited in each cell. The bees are active before and after the monsoon.

Since these bees are useful pollinators and the damage caused by them is not much, no special control measure need be adopted. Foliage sprays used against other pests will, however, control the activity of the bees.

Digger Wasps

In October, after the rose plants are subjected to the annual pruning, one finds at times that some of the pruned branches begin to dry from the tip downwards. On closer examination, some of the branches showing these symptoms, commonly known as Dieback, are found to have been tunnelled through the pith from the cut end downwards. When cut open, each one of these tunnels is found to harbour the small nest of a solitary wasp which, because of this peculiar nesting habit, is commonly known as the Digger Wasp (Fig. 7). Soon after the rose plant is pruned, the Digger Wasp digs a burrow into the pith of the stem through the cut end for building its nest. The burrow is linear and its length ranges from 12 to 17 cm. ($4^1/_2$ to $6^1/_2$ in.). The tunnel generally remains open at the cut end.

The Digger Wasp preys on flies, and the paralysed flies are carried into the burrow and stored as food for the young one which is yet to hatch from its egg.

As a result of this burrowing, a fungus causing the Dieback disease often gains entry into the branch tissue despite the application of a fungicide at the cut end. Consequently the branch begins to die from the tip downwards.

For checking the Digger Wasp, sufficient Aldrin should be incorporated into the fungicidal paint so as to make it 0.1 per cent in the paste (equal parts of copper carbonate and red-lead by weight, and enough linseed-oil to make a thick paste) used for controlling the Dieback disease.

Mealy Bugs

In spring, one sometimes observes Mealy Bugs on the stalks of buds and flowers. These are plump, oval, purplish, soft-bodied, wingless insects, about 6 mm. ($^1/_4$ in.) long, having many whitish waxy filaments protruding from the surface. They keep on sucking the plant sap, as a result of which the buds do not open and the flowers wither away. If the infested area is small, the bugs can easily be picked up with a forceps. In larger gardens chemical control may be necessary. The insecticides recommended for Red Scales can control Mealy Bugs also.

Besides the insect pests listed above, there are two important non-insect pests, viz. Mites and the Nematodes (or Eelworms), which also attack rose plants.

Mites

Mites are tiny creatures, hardly visible to the naked eye. The species attacking the rose is popularly known as the Red Spider Mite (Fig. 8). It is of world-wide distribution and attacks a number of other plants besides the rose, e.g. castor, cotton, okra, tomato and brinjal.

Mites live gregariously on the underside of leaves and are protected by a silky web. Both the adults and the young suck the plant sap, causing characteristic blotching on the leaves. The leaves dry up when the infestation is severe.

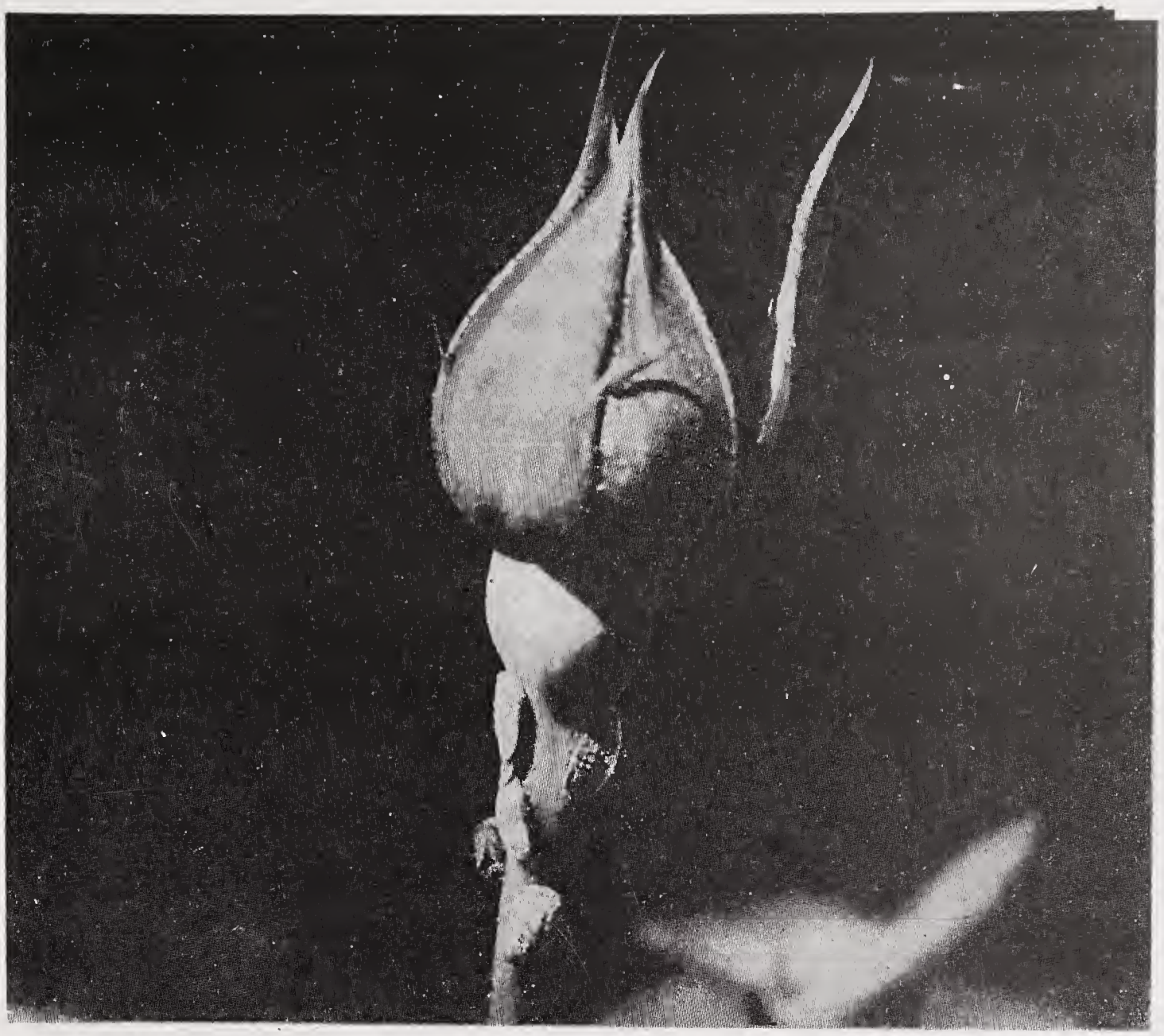
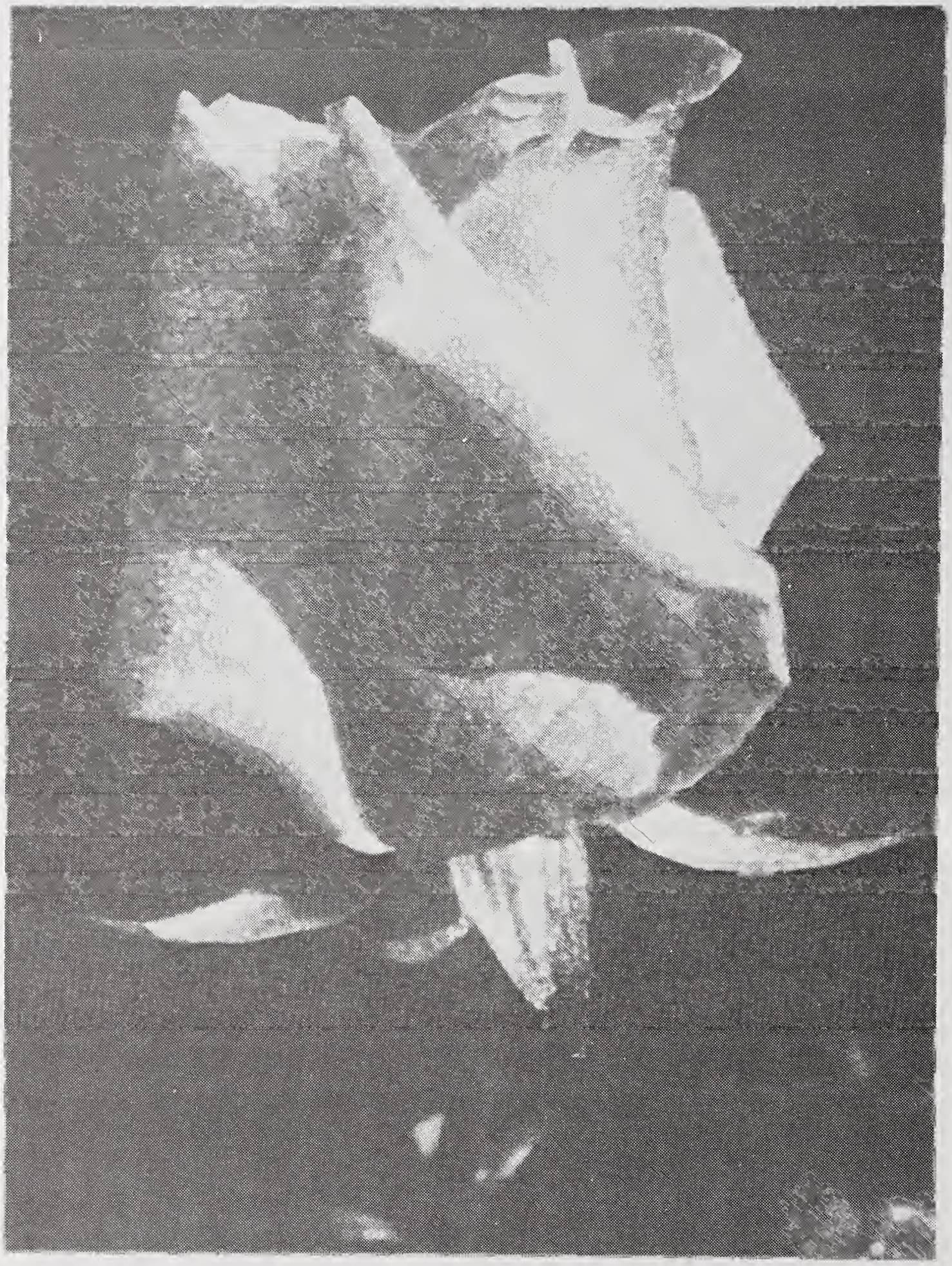


FIG. 15. Mealy Bugs at the base of a flower bud



FIG. 16. Leaves withering owing to infestation by the Web-forming Spider



62. 'Henry Ford' (H.T.)
Well-formed exquisite long, pointed buds are produced on a moderately vigorous healthy plant. Delicious strong fragrance.

Mites first appear on the rose plant at the onset of the monsoon and are found there till April next year, although the active season is from September to January. With the increase in temperature in summer, their population is considerably reduced and only a few survive under grasses, in bark crevices and under fallen leaves of various plants.

The pest can be controlled by spraying the affected plants with 0.05 per cent Monocrotophos which should be used with care. Other alternatives recommended are 0.1 per cent Kelthane and 0.1 per cent Diazinon emulsions.

Spiders may sometimes be noticed weaving webs around the ornamental rose plant (Fig. 16), often cutting off sunlight from the leaves. An occasional cleaning with a soft cloth or a brush is all that is necessary to keep away the web-forming Spiders. But if the infestation is severe, chemical control may be necessary. The pesticides that control the Spider Mites can effectively check Spiders also.

Nematodes

A survey at the Indian Agricultural Research Institute has shown the presence of several plant parasitic Nematodes in the rose beds. These Nematodes, or Eelworms, are minute microscopic organisms infesting the root zone of the rose plants. Nematode injury to the roots results in symptoms of malnutrition, decreased shoot growth, unproductivity and increased susceptibility to other disease-producing agents.

For the control of these pests, soil fumigants like Shell DD and Nemagon are available in the market. In order to ensure a healthy growth of the rose plants, it is advisable to fumigate the rose beds, 4–6 weeks before plantation, with DD at the rate of 250 litres per hectare ($22^1/_4$ gallons per acre). Nemagon, however, can be used even in the planted bed if the growth of the bed is not satisfactory and it is suspected to be a case of Nematode infestation. Nemagon is used at the rate of 10–12 litres per hectare (about 1 gallon per acre) through irrigation water. These chemicals are quite expensive and need to be used only if Nematodes are known to be present in large numbers.

LIST OF SOME OTHER PESTS ON ROSE REPORTED FROM VARIOUS PARTS OF INDIA

Red-brown Tussock Caterpillar	Feeds on leaves
Castor Slug	Feeds on leaves
Castor Semi-looper	Feeds on leaves
Crab Caterpillar	Feeds on leaves
Girdler Beetle	Damages the stem
Mealy Wing	Infests the leaves and sucks plant sap

Control Schedule for Rose Pests

At the Time of Preparing the Rose Beds: The soil should be fumigated with nematicide DD at the rate of 250 litres per hectare (22 $^{1}/_{4}$ gallons per acre) 4–6 weeks before planting. After the bed is fully prepared it should be treated with 5 per cent Aldrin or Phorate 10 G granules at the rate of about 1 kg. of active ingredient per hectare (400 g. active ingredient per acre). The treatment will disinfest the soil of Nematodes and keep the rose plants safe from the attack of White Ants and white grubs. It will also act as a prophylactic measure against later attack by the Chafer Beetles.

At the Time of Pruning: Aldrin should be incorporated into the fungicidal paste to be applied at the cut ends. Fenitrothion or Malathion 0.1 per cent should be applied to control the Red Scale; this will also control Mites, if any.

January–March: A light dusting with 0.2 per cent 'Pyrodust' would help control Aphid infestation if it is becoming troublesome. This will also control Thrips if they appear a little early in the season.

July–August: Fenitrothion or Malathion 0.1 per cent should be sprayed against Chafer Beetles. It will also kill Thrips if any.

A Word of Caution

Many pesticides are highly poisonous. It is therefore necessary to follow strictly the instructions and precautions given on the manufacturer's labels, including those in very small prints. It is also advisable to store these materials out of the reach of children and pets, and away from food-stuffs.

LIST OF INSECTS, MITES AND NEMATODES, AND THE METHODS OF THEIR CONTROL

Pest	Nature of damage	Pesticide with some commercial names	Actual formulation and concentration to be applied	Concentration of common commercial products	Quantity of pesticides to be used	No. of treatments	Remarks
White Ants	The plants dry up and can be easily pulled out. The cuttings fail to sprout	Aldrin ('Aldrex', 'Hexamar Aldrin')	Dust, 5%	5% Dust	1/2 teaspoonful *or* 3 g. dust/sq. metre (1.4 drams/sq.yd.)	One	The pest is more active during January–February and September–October. In the beds, where the cuttings are to be planted the dust should be evenly spread and mixed with the soil with a rake. In pits, the insecticide should be thoroughly mixed with the soil before transplanting the rose saplings. The treatment should be carried out at least 15 days before planting
		Phorate 10 G	Granules	10 G granules	3 g. granules/ sq. metre		
Red Scales	Reddish-brown waxy scales appear like pox marks on the tender shoots and stems; the affected portions dry up	Malathion ('Malapos')	Emulsion, 0.1%	50% E.C.	3 teaspoonfuls *or* 10 c.c. in 5 litres of water (3 fluid oz. in 10 gallons)	Two or three at 15-day intervals	
		Fenitrothion	Emulsion, 0.1%	50% E.C.	3 teaspoonfuls *or* 10 c.c. in 5 litres of water (3 fluid oz. in 10 gallons)	Two or three at 15-day intervals	

(Continued)

LIST OF INSECTS, MITES AND NEMATODES, AND THE METHODS OF THEIR CONTROL

Pest	Nature of damage	Pesticide with some commercial names	Actual formulation and concentration to be applied	Concentration of common commercial products	Quantity of pesticides to be used	No. of treatments	Remarks
		Diazinon ('Basudin')	Emulsion, 0.1%	20% E.C.	$7\frac{1}{2}$ teaspoonfuls *or* 25 c.c. in 5 litres of water (7 fluid oz. in 10 gallons)	Two or three at 15-day intervals	
Chafer Beetles	Adult beetles feed on the leaves at night; irregular cuts and punctures in the leaves are noticed	Aldrin ('Aldrex', 'Hexamar Aldrin')	Dust, 5%	5% Dust	3 teaspoonfuls *or* 20 g./sq. metre (9 drams/sq. yd.)	One	In August–September the damaged leaves are commonly noticed. The foliage should be thoroughly sprayed for checking the damage
		Malathion	Emulsion, 0.1%	50% E.C.	3 teaspoonfuls *or* 10 c.c. in 5 litres of water (3 fluid oz. in 10 gallons)	Two or three at 15-day intervals	Also, while carrying out earthing and other operations, the white grubs of the Chafer Beetles should be picked and killed
Aphids, or Plant Lice	The buds and flowers get disfigured and wither away	Pyrethrins ('Pyrodust')	Dust, 0.2%	0.2% Dust	6 teaspoonfuls *or* 30 g. for a bed of 10 sq. metre (1.4 drams/sq.yd.)	One; repeat if necessary	The pest increases during January–February period. The affected flowers and buds should be lightly dusted in the mornings or evenings when it is not windy

LIST OF INSECTS, MITES AND NEMATODES, AND THE METHODS OF THEIR CONTROL

Pest	Nature of damage	Pesticide with some commercial names	Actual formulation and concentration to be applied	Concentration of common commercial products	Quantity of pesticides to be used	No. of treatments	Remarks
Thrips	These rasp the underside of leaves which later dry up	Malathion	Emulsion, 0.1%	50% E.C.	3 teaspoonfuls *or* 10 c.c. in 5 litres of water (3 fluid oz. in 10 gallons)	Two at an interval of a week	The pest is observed during March–November. Spraying can be done in the mornings or evenings when it is not windy. During the monsoon, plants should be sprayed with any of the emulsions. Care should be taken that the underside of the leaves is properly covered with the insecticide
		Fenitrothion	Emulsion, 0.1%	50% E.C.	3 teaspoonfuls *or* 10 c.c. in 5 litres of water (3 fluid oz. in 10 gallons)		
		Diazinon	Emulsion, 0.1%	20% E.C.	$7\frac{1}{2}$ teaspoonfuls *or* 25 c.c. in 5 litres of water (7 fluid oz. in 10 gallons)		
Jassids	The leaves lose their natural colour and become dull-whitish yellow, and subsequently dry up: the damaged plants have a sickly appearance	Malathion	As in the case of Scale insects	50% E.C.	3 teaspoonfuls *or* 10 c.c. in 5 litres of water (3 fluid oz. in 10 gallons)	Two at 15–21-day intervals	
		Fenitrothion	Emulsion, 0.1%	50% E.C			
		Diazinon		20% E.C.	$7\frac{1}{2}$ teaspoonfuls *or* 25 c.c. in 5 litres of water (7 fluid oz. in 10 gallons)		

(Continued)

LIST OF INSECTS, MITES AND NEMATODES, AND THE METHODS OF THEIR CONTROL

Pest	Nature of damage	Pesticide with some commercial names	Actual formulation and concentration to be applied	Concentration of common commercial products	Quantity of pesticides to be used	No. of treatments	Remarks
Digger Wasp	They dig burrows into the pith of rose stems through the cut ends for building their nests; the stem begins to dry up from the top downwards	Add to the fungicide paint Aldrin to make 0.1% in paint	Dust, 5% to make 0.1% in paint	5% Dust	10 g. of Aldrin dust in 500 g. of fungicidal paint	One	The cut ends of the pruned stems should be treated with 0.1% Aldrin which can be added to the fungicidal paint
Mites	Characteristic blotching of the leaves which dry up if the infestation is severe	Dicofol ('Kelthane')	Emulsion, 0.1%	18% E.C.	9 teaspoonfuls *or* 27 cc. in 5 litres of water (8 fluid oz. in 10 gallons)	Two or three at 15-day intervals	
Nematodes (Eelworms)	Symptoms of malnutrition, decreased shoot growth, unproductivity, yellowing of leaves	Diazinon	As in the case of Scale insects				
		DBCP ('Nemagon')	Emulsion, 60%	60% E.C.	7 teaspoonfuls *or* 25 c.c. for a bed of 10 sq. metres (6 fluid drams for 10 sq. yd.)	One	The nematicide is to be used in irrigation water. The other alternative is to give light irrigation, apply the nematicide in water, and irrigate again. This helps in carrying the nematicide to the root zone. This is a poisonous substance and should be used only by trained persons

CHAPTER 11

DISEASES

Roses are attacked by several diseases, some of which can be very destructive. Except for a few cases where the causal agent may be a virus, bacterium or nematode, most diseases of the rose are incited by fungi. In India about 24 fungi have been recorded so far on the rose. They are *Diplodia rosarum, Sphaerotheca pannosa* var. *rosae, Diplocarpon rosae, Phragmidium* spp., *Cercospora* spp., *Pestalotia* spp., *Apiospora* sp., *Teloconia* sp., *Monochaetia* sp., *Hypoxylon* sp., *Sphaerella* sp., *Septoria* spp., *Valsa* sp., *Cryptostictis* sp., *Massaria* sp., *Gnomonia* sp., *Fabraea* sp., *Massarina* sp., *Gloeosporium* sp., *Chaetomium* sp., *Curvularia* sp., *Merulius* sp., *Pestalotiopsis* sp. and *Alternaria* spp.

A Yellow Mosaic disease of the rose has been reported to occur in India. However, no detailed information is available, which is necessary to control the disease by heat- or chemotherapy. Symptoms like those of the Mosaic disease have been observed on rose plants in many gardens, and it is necessary to take up this work in order to determine whether or not the Mosaic disease which is due to a virus is also prevalent in India. Some of the important and destructive diseases are Dieback, Stem Blight and Black Spot. In the hilly regions of India, Powdery Mildew and Rust are relatively more important.

Dieback

Dieback, as the term implies, causes the death of the plant from the top downwards. It starts mainly from the pruned surface of the twig. The disease may extend to a few centimetres below the pruned ends or, if the environmental conditions are favourable, may spread further, killing the whole plant. The diseased twigs become black. A partially diseased twig when split open shows the internal spread of the disease at least 2.5 cm. (1 in.) below the lesion visible on the outside. In the advanced stage, the disease passes from the branch

twig to the main stem, and from there to the roots, killing the whole plant. Old plants are more frequently attacked than the younger ones. The stems and roots of the dead plants show a browning of the internal tissues. Dieback infection through flower stalks, following withering of blooms, has also been reported. Although infection of flower stalks is frequently noticed in Delhi, its spread is limited to a few centimetres on the twig. Dieback may also start from the bud union which may have become infected during the process of budding.

The role of the Digger Wasp in inciting Dieback has already been mentioned in the previous chapter. The Digger Wasp burrows into the pith through the cut ends of the pruned canes for nesting. It leaves behind a stretch of empty tunnel about 12–17 cm. (5–7 in.) long. These twigs readily dry up and frequently lead to Dieback.

The principal cause of Dieback is a fungus called *Diplodia rosarum*. It produces two-celled, dark-coloured spores in tiny, round, black bodies called pycnidia. Often a species of another fungus, *Colletotrichum*, is also associated with the affected shoots.

The fruiting bodies of the fungus are usually present on the thorns of old shoots throughout the year. Small seed-like bodies called spores are formed. They infect the shoots, resulting in dark-tan superficial lesions on the bark. The fungus may also persist in dead twigs and the stalks of withered blooms, where abundant fruiting bodies develop under humid conditions. The superficial lesions on the bark have been observed to lead to the Dieback disease if pruning is effected at their site. Generally, the disease takes hold of the plant when it is weakened owing to other reasons.

To control the disease, pruning should be done so that the lesions on the shoots are eliminated. Partially diseased twigs should be pruned at least 2.5 cm. (1 in.), preferably 5 cm. (2 in.), below the visible signs of the disease on the outer surface. The sharp-edged knife for pruning should be dipped in 70 per cent alcohol or formaldehyde. In all cases, the pruned end should be immediately coated with a paint made up of equal parts of copper carbonate and red-lead by weight and just enough linseed oil to make a thick paste, with 0.1 per cent each of DDT and BHC. The incorporation of the insecticides into the paint is necessary to ward off attack by the Digger Wasp,



FIG. 17. Dieback disease



FIG. 18. Black Spot

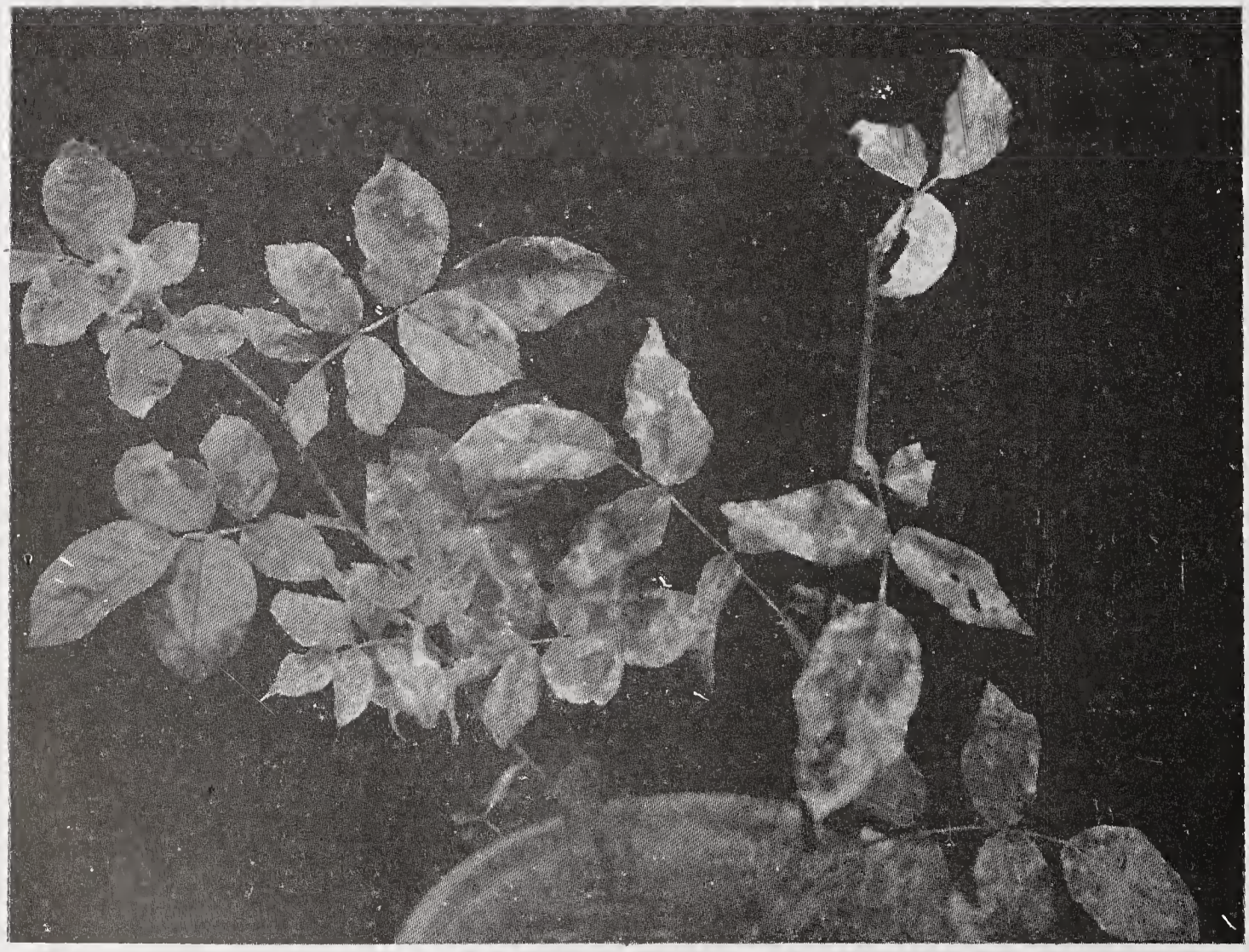


FIG. 19. Powdery Mildew

which is an important factor in the Dieback complex. Under the conditions prevailing in Delhi and surrounding areas, spraying the plants soon after pruning with Metacid 50 E (1 c.c.), Captan or Blitox (2 g.) added to one litre of water has reduced the incidence of Dieback. It has also been observed that as soon as the leaves become large and acquire green colour, foliar spraying of urea (2 g.), Metacid 50 E (1 c.c.) and Captan or Blitox (2 g.), all mixed in one litre of water, has provided good growth to the plants apart from affording protection against some pests and diseases. Application of fertilizers should be delayed for at least 10 days after pruning.

No definite information is available on the tolerance of any varieties to the disease, but it is better to avoid the cultivation of a variety which suffers heavily from this malady in a particular locality.

Stem Blight

Older plants of some varieties often show a spotting of the canes. These spots are tan-coloured and variable in size. The younger shoots are usually free from the spots. Some varieties like 'Helen Traubel' are extremely susceptible and show the disease prominently. Several of these spots merge together and spread to the entire bark, imparting to it an ashy-brown appearance. Although the disease is confined to the bark and usually does not kill the shoots, it provides constant infective material of the associated disease-causing organisms which are also involved in the Dieback. This infectious inoculum is present on the thorns for most part of the year. Occasionally, young shoots emerging from heavily spotted canes get blighted.

The fungi commonly associated with these spots are the same as with Dieback. In older plants other non-parasitic fungi may get associated with these bark lesions and cause cankering of the stem. Control measures are expensive, but one or two sprayings every year with an organic fungicide such as Captan can be very useful in suppressing these disease-causing organisms.

Black Spot

This is a widely distributed disease. In India it is reported from

Bombay, Jammu and many other areas, and appears every year in Delhi. Black Spot can be distinguished from other leaf spots by the darker colour and fringed margins of the spots, which occur on both sides of the leaf.The disease is incited by a fungus called *Diplocarpon rosae*. Some varieties get defoliated soon after infection, while in others the infected leaves remain attached to the plants with spots as big as a centimetre in diameter. The fungus is said to produce ethylene gas, which causes premature defoliation.

Before the disease appears, a regular foliar spray with Ferbam (Hexaferb) or Captan is recommended for its control. The fungicides should be applied at intervals of 7 to 14 days at the rate of 1 kg. in 500 litres (1 lb. in 50 gallons) of water. The spotted leaves should be collected and burnt before spraying.

In other leaf spots several species of *Septoria* and *Cercospora* are reported from India. The control measures for these leaf spots are the same as for the Black Spot.

Powdery Mildew

This disease has been reported from Bombay, Dehra Dun, Nagpur, Simla and Srinagar. It is also known to occur in Indore and Bangalore. It is observed only very occasionally in Delhi on a few susceptible varieties, especially under shady conditions; however, it can be severe during years of scanty rainfall. It is serious in warm, humid weather with cool nights. Powdery Mildew may affect all the aerial parts. Younger leaves get curled, exposing the lower surface, on which are found raised blister-like areas, which may become coated with the white powdery growth of the fungus. Young growing tips get completely covered by the Mildew. As the cells are killed, dark spots somewhat resembling those caused by the Black Spot may be noticed. Quite frequently, infected buds do not open. The petals may become discoloured, dwarfed, and finally die. The organism causing Mildew is a fungus called *Sphaerotheca pannosa*.

The disease is air-borne and can be controlled with foliar sprays with wettable sulphur at the rate of 1 kg. in 500 litres (1 lb. in 50 gallons) of water. Spraying may be repeated at intervals of 5 to 7 days, depending upon the severity of the disease and the weather conditions. Sulphur causes damage to plants at temperatures higher

Diseases of Roses and Their Chemical Control

Disease	Causal agent	Symptoms	Fungicidal treatment Common name	Trade name	Dosage	Source for obtaining fungicide	Remarks
Dieback	*Diplodia rosarum* Fr.	Affected plants show blackening as well as death of the twig from the cut end downwards; often the entire plant is killed		Rose paint	Equal parts of copper carbonate and red-lead by weight and enough of linseed-oil to make a thick paste, with 0.1 % DDT and 0.1 % BHC	British Drug House (India) Private Ltd, Bombay	The paste should be applied once a year at the cut ends of the twig immediately after pruning. Addition of BHC and DDT keeps the Digger Wasp away
Powdery Mildew	*Sphaerotheca pannosa* var. *rosae* (Wallr.) Lév.	The infected leaves become curled and dwarf, turn purplish, wither and fall prematurely. Buds may not open, and get distorted or dwarfed. A white to grey powdery or felt-like mass appears. The mycelium and conidia are superficial	Wettable sulphur	Microsul	0.2 %	Bharat Pulverising Mills Pvt. Ltd, New Delhi - Bombay	Wettable sulphur or Dinocap should be sprayed at weekly intervals. Systemic fungicides (Benomyl/ Carbendazim) can be sprayed at three-week intervals above 32°C. (90°F.), spraying with wettable sulphur and Dinocap should be avoided as they are phytotoxic. It is always advisable to start fungicidal spraying a little earlier before the usual time of appearance of the disease. The num-
				Sultaf	0.2 %	Rallis India Ltd, New Delhi - Bombay	
				Cosan	0.2%	Ciba of India Ltd, New Delhi	
			Dinocap	Karathane	0.1 %	Indofil Chemicals Ltd, New Delhi - Bombay	
			Benomyl	Benlate	0.1 %	Bharat Pulverising Mills Pvt. Ltd, New Delhi - Bombay	
						Agromore Ltd, Bangalore	
			Carbendazim	Bavistin	0.1 %	BASF India Ltd, New Delhi - Bombay	

(Continued)

Disease	Causal agent	Symptoms	Fungicidal treatment Common name	Trade name	Dosage	Source for obtaining fungicide	Remarks
							ber of sprays will depend on the intensity of the disease
Black Spot	*Diplocarpon rosae* Wolf	Conspicuous circular black spots, less than 1 cm. in diameter, with fringed margins on the upper surface of the leaves; the leaves become weak and fall early	Captan	Hexacap	0.2 %	Bharat Pulverising Mills Pvt. Ltd, New Delhi - Bombay	The affected plants should be sprayed with fungicide, particularly on the underside of the leaves, at intervals of 7–14 days, as soon as the disease appears on the host plants. Three to four sprayings are enough to control the disease
				Captaf	0.2 %	Rallis India Ltd, New Delhi - Bombay	
			Ferbam	Hexaferb	0.2 %	Bharat Pulverising Mills Pvt. Ltd, New Delhi - Bombay	
Rust	*Phragmidium* spp.	Infected parts show small, brown-black rust pustules on the leaves, petioles and stems. The leaves wither and fall early	Ferbam	Hexaferb	0.2 %	Bharat Pulverising Mills Pvt. Ltd, New Delhi - Bombay	Begin spraying before the appearance of the disease at 7–10-day intervals. Give 3 or 4 applications, if necessary
			Zineb	Dithane Z-78	0.2 %	Indofil Chemicals Ltd, New Delhi - Bombay	

Disease	Causal agent	Symptoms	Fungicidal Common name	treatment Trade name	Dosage	Source for obtaining fungicide	Remarks
Stem Blight	*Diplodia rosarum* Fr.	Brown to black spots on the stem	Captan	Hexacap	0.2 %	Bharat Pulverising Mills Pvt. Ltd, New Delhi - Bombay	The plants should be sprayed to dip-drench, once in early September and again in late October
				Captaf	0.2 %	Rallis India Ltd, New Delhi - Bombay	
Yellow Mosaic		Infected plants show yellow bands adjacent to veins					The infected plants should be destroyed and only healthy sources of budwood be used

than 32°C. Other fungicides can also be effectively used as indicated in the accompanying table.

Rust

In India, Rust is widely distributed in the hills of Simla, Kasauli, Mussoorie and Kashmir. It has more recently been reported also from the important rose-growing area around Khamnor, Rajasthan. Yellowish to black swellings called pustules are produced on the leaves, petioles and stems, imparting a rusty appearance to the shoots. The disease is caused by several species of *Phragmidium*; four of these are reported in India. The disease is restricted to higher altitudes. Therefore foliar spray with 1 kg. of Ferbam (Hexaferb) plus 1 kg. of wettable sulphur in 500 litres (1 lb. each in 50 gallons) of water with Sandovit as a spreader should be applied at weekly intervals.

Virus Diseases

Dr F.O. Holmes in the U.S.A. long ago studied the Mosaic disease of the rose and found that it could be cured by heat-treatment. As in apple and citrus, it is necessary to raise virus-free budding eyes of roses meant for export, since such buds are required for establishing newer varieties of roses in different countries. If diseased budding eyes are shipped or flown from one country to another, or from one part to another part of the country, there may be danger of spread of the virus disease. Therefore quarantine both at the international and domestic levels should be enforced so that virus diseases may not spread. While mailing buds of roses, it will be necessary to insist on health certificates for freedom not only from fungi but also from viruses.

CHAPTER 12

ROSE BREEDING

While by the rosebed gay you stood,
and revelled in the multitude,
Of blooms with unfamiliar names, and traits
and folds new-found, new sweet,
We wondered much at the rich power which
breeds so many and many a flower,
Not like the myriads known before,
and each one lovely and complete.

– Edmund Blunden

THE creation of new forms of plants and animals is a fascinating subject. In the case of roses the pleasure is increased manifold by virtue of the nature of the subject. Rose breeding is now done on a very large scale, involving the raising of thousands of seedlings, by nurserymen in France, Germany, Spain, the Netherlands, the United Kingdom, the United States, Canada, Australia, New Zealand and in several other countries. One country which has recently come into the field in a strong way is Japan and the contributions of Teranishi, Suzuki and Onodera are well known. In India also, rose breeding was taken up and the first available record of an Indian-raised variety is that of the Hybrid Tea 'Dr S.D. Mukherjee', bred from the cross 'Hadley' × 'Fascination' by B.K. Roy Choudhury, and introduced in 1935. In the early period B.S. Bhatcharji and his sons were the principal rose breeders who played a pioneering role. They were followed by others, and today there is a considerable amount of activity in the field, both by professional nurserymen and amateurs. The number of the latter is large because the amateur with only a limited amount of garden space and other resources can also derive pleasure by growing roses from seed and selecting the best ones

from among these. Naturally the chances of success are much less than in the case of professional rose breeders working for firms with all the facilities that modern plant breeding requires. However, even without such facilities, if one is lucky one may bring out something very worth while in the form of a new variety. In fact there are several instances where varieties raised by amateurs have proved very successful.

HOW DO NEW VARIETIES ARISE?

There are two ways in which new varieties of roses can be had: first, there may occur a natural mutation or 'sport', as a result of which a plant of an existing variety puts forth a shoot in which a genetical change has occurred. If vegetative propagation is done from this mutated branch, a new variety will result. Many climbing forms of well-known Hybrid Tea roses have arisen in this way. It is possible nowadays to stimulate the production of mutations or 'sports' by using X-rays, radioisotopes, etc. The other method of producing new roses, and by far the more important one, is by raising plants from true seed, which may be the result of artificial or natural cross-pollination. Some general hints on raising roses from seed are given below.

Rose Fruits and Seeds

Many people are not aware that roses bear fruits which contain seeds. If flowers are not cut off, the lower rounded portion below the calyx lobes will swell and develop into a fruit called 'hip' or 'hep', or sometimes 'apple'. Not all varieties develop them. Hip formation is particularly profuse in some of the wild roses and, since these often become orange or red when ripe, they add to the attractiveness of the bushes. The size and shape of the hip varies with the variety; it may be rounded in some, and urn-shaped or elongated in others. The size also ranges from quite small fruits to those which are about the size of a small crab-apple.

Hybridization

Roses in nature are usually cross-pollinated by insects, espe-

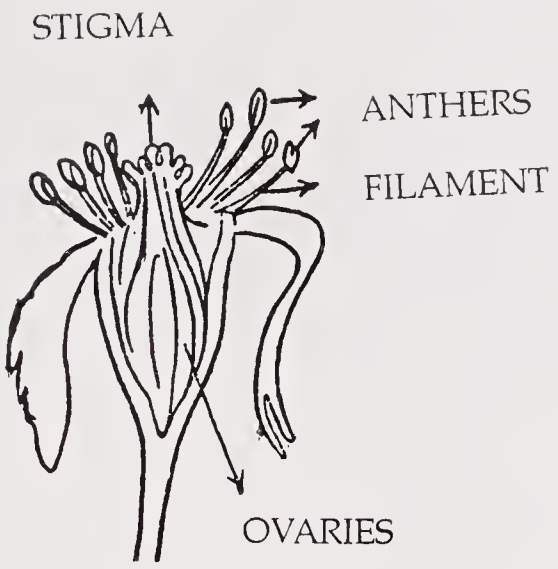


FIG. 20. Cross-section of a rose flower

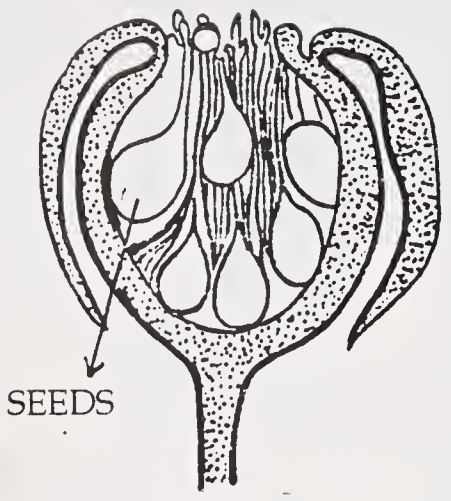


FIG. 21. Cross-section of a mature rose fruit

cially the bees. when the rose exposes its golden anthers, the bees can be seen wandering luxuriously among them, gathering their golden spoil. Roses do not normally secrete honey, and the insect visitors attracted by the colour and the perfume come to collect pollen for food. Seeds from naturally formed rose fruits may give a variable progeny, especially in the modern varieties possessing a complex pedigree, so that even without resorting to artificial crossing, or hybridization as it is called, new forms may be obtained.

The professional rose breeder will no doubt attempt to make crosses under controlled conditions, with the object of creating new varieties which will combine in themselves the desired constellation of characters. It is necessary to choose the parents carefully. Crossing itself is quite a simple process. Here are the steps:

1. From the variety to be used as the female or seed parent, remove the anthers or stamens with a pair of finely pointed scissors. This should be done before the pollen starts bursting out of the anthers.

2. Take a flower of the variety selected to be the male or pollen parent and remove the petals. As the anthers begin to burst, rub them gently against the pistil or central disc of the flower of the seed parent. Alternatively, pollen may be applied to the pistil with the tip of the forefinger, or with a small soft brush. If you are an amateur rose breeder like me, working not in a glass or polyhouse but in the

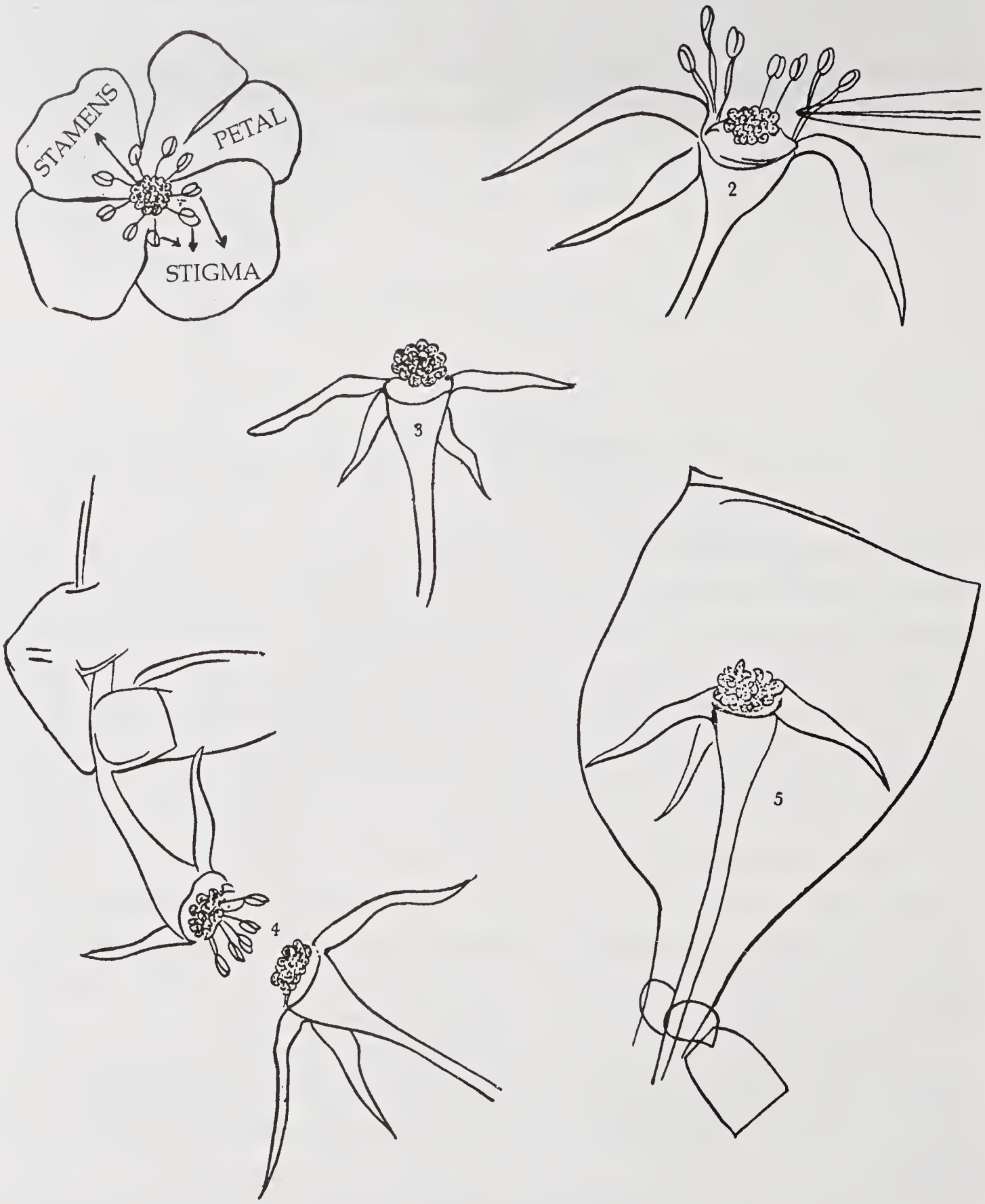


FIG. 22. Crossing technique

1, a rose flower (diagrammatic); *2*, removal of stamens, before their bursting, from the flower of a seed parent; *3*, the flower of seed parent ready for crossing; *4*, rubbing of ripe anthers of the de-petalled flower of the male parent on to the disc of the female parent; *5*, crossed flower protected with polythene bag



Rosa moschata



'Frolic'



'McGredy's Ivory'

FIG. 23. Rose fruits

open, then it is essential to take action in the early part of the morning before the honey-bees come foraging to ravage the stamens and take away the golden loot. Here, I cannot resist quoting Humbert Wolfe's lines:

Rose, shut your heart against the bee,
Why should you heed his minstrelsy?
Refuse your urgent lover, rose,
He does but drink the heart and goes.

3. Put a polythene bag round the crossed flower to protect it; also attach a small label and write the names of the varieties crossed, keeping the name of the female parent first (e.g. 'Crimson Glory' x 'Buccaneer'). It is better to note the date of the 'operation' because if a number of cross-pollinations are made during the crossing season, a tabulation of the results would give the best period for making crosses.

If several different crosses are to be made, the brush or finger used for applying the pollen should be cleaned before each operation. Pollen can be collected and stored for some time, in clean, dry phials, for use when the stigmas of the selected, emasculated flowers become receptive.

In successful crosses, the hips will develop and swell, and in due course become yellow or orange, or even red or black (in a few cases, however, they may continue to remain green). Generally, three or four months are required for the seeds to mature. When the fruits begin to shrivel and turn a little brownish or when the flower stalk turns yellow they should be collected and thoroughly dried. If a slit is made with a knife, it will facilitate the extraction of the seeds later.

Sowing Seeds

The fruits when fully ripe are quite hard and it is not easy to extract the seeds with the fingers. Some rose breeders recommend storing the whole fruits in pans or 'flats' in moist soil until they soften naturally after a few weeks. But when this is done, watch should be kept against damage by rats or insects.

The extracted seeds may be sown about 5 cm. (2 in.) apart, in pans, flats or even in small plots the surface of which has beer

carefully prepared and levelled. Good garden soil used for sowing annuals is quite suitable for roses too. In Delhi, sowings in October–November have given good results. The seeds may take several weeks or even more to germinate.

When the seedlings are a few centimetres high, they can be transplanted into larger pots.

Care of Seedlings

Rose seedlings tend to flower even when quite tiny, and thus exhaust themselves. The flower buds should be pinched off as soon as they appear, until the plants are reasonably big and sturdy. They should then be let to flower, and the better ones should be selected for budding on to 'Rose Edouard' or other root-stocks. Only after budding is it possible to assess finally the comparative value of the new seedling variety *vis-a-vis* the established varieties.

ASSESSMENT OF NEW VARIETIES

Young seedling varieties may look very beautiful, but it is not safe to judge them until they have been budded and grown in a row of at least three plants, alongside the older varieties of similar colour. A large number of the seedlings will in all probability prove inferior to the existing varieties, which, after all, represent the best work of accomplished rose breeders all over the world. In order to increase the chances of success some of the large commercial firms abroad raise 100,000 or more seedlings each year. These are subjected to rigorous selection and only a small number of really promising ones enter the stage of final trials. However, even if one is fortunate enough to obtain only one outstanding 'break', all the trouble would be worth while, for that would mean the birth of a new star in rosedom.

Naming of Varieties

When a new variety has been found after trials to be worthy of release, it is necessary to name it. There are international rules of nomenclature which are applicable to wild plants and to cultivated plants. What the gardener is most concerned with is the unit of

classification called the 'variety'. In the case of a botanical classification this term has a somewhat different meaning from that in which the average person uses it. Therefore, to avoid confusion, horticultural varieties, i.e. varieties of fruits, vegetable and flowering plants in the sense we refer to them in ordinary garden parlance, are called 'cultivars' and should be referred to as such in scientific terminology. The names of cultivars are given in single inverted commas, e.g. 'Crimson Glory'. In this book the word variety has been retained, as it is the word normally used by gardeners, but it must be clearly understood that what is actually meant, in scientific terminology, is the 'cultivar'.

It would be difficult to summarize the rules of nomenclature in a few paragraphs. Here it would suffice to state that the name should be short, consisting of one or two words, or at the most of three words; the name should not have been used previously for another variety of the same plant; it should be appropriate as far as possible. Rose names are many and varied. Some names are based on musical terms. Thus we have 'Concerto', 'Fugue', 'Harmony', 'Madrigal', 'Prélude' and 'Symphonie'. Others are connected with grand opera and ballet: for instance, 'Ballet', 'Mme Butterfly', 'Opera', 'Prima Ballerina' and 'Show Girl'. Some names speak of love and romance: these include, 'Burning Love', 'Careless Love', 'First Love', 'Honeymoon', 'Love Song', 'Passion' and 'Sweetheart'. Others refer to the world of fashion: hence 'Chanelle', 'Chic', 'Christian Dior', 'Fashion' and 'Vogue'. Children's tales have supplied names like 'Bashful', 'Bo-Peep', 'Cinderella' and 'Peter Pan'. Qualities or states of mind have not been neglected, and that is why we have 'Confidence', 'Felicity' and 'Happiness'. 'Peace', one of the outstanding roses of this century, received its name during the founding session of the United Nations in San Francisco. But the largest number of roses record the names of Emperors and Empresses, Kings and Queens, Cardinals and Generals, as well as of more humble people. In recent times there has been a tendency to name roses after newspapers or after various products in commerce resulting in names like 'Benson and Hedges Gold' and 'G.P. and J. Baker' which, at least to some of the older generation, do not appear to be particularly felicitous ones for the Queen of the Flowers. And coming across a name like

'Sunday Brunch', one begins to wonder.

However, it is not only among recent rose introductions that we can find unusual or even intriguing names. Hazel Le Rougetel in her charming book, 'A Heritage of Roses', published very recently, mentions a beautiful old variety from China, which staggers under the (translated) name of 'Tipsy Imperial Concubine' !

Rose Names in India

Indian rose names like those of other countries commemorate the names of monarchs, presidents and prime ministers, of persons who have achieved success in political, economic and other fields, of people who have been connected with the breeding and promotion of roses, etc. In the earlier Indian-raised varieties the names of those who participated actively in the Freedom Movement have been remembered. But not all rose names are prosaic. Some like 'Poornima' and 'Chandrama' recall the radiance of India's full-moon nights; others like 'Apsara', 'Paharan', 'Banjaran' and 'Chambe di Kali' pay a tribute to the beauty of Indian women; yet again, some like 'Prema', 'Priyatama' and 'Dil ki Rani' refer to love and the beloved. At least one, 'Sailoz Mookherjea', remembers the creative orginality of a gifted young artist who passed away while still in his prime.

Once a varietal name has been given and published, it is not normally permissible to change it. Since the public is put off by long names, which are often also difficult to pronounce, one can sympathize with those who wish to rename rose varieties with names like 'Frau Oberbürgermeister Piecq', 'Ghislaine de Féligonde', 'Gloire de l'Exposition de Bruxelles', 'Herzog Friedrich II von Anhalt', 'Mevrouw van Straaten van Nes' and 'Fiancelles de Princesse Stephanie de Beligue et de l'Archidue Rudolphe'. But in recent years even simple names have been changed for reasons difficult to understand. Thus, 'Message' has become 'White Knight' in America and 'Super Star' rechristened 'Tropicana'. 'Maria Callas' named after the well-known prima donna with a glorious voice, has, sadly, been changed to the awkward 'Miss All-American Beauty'. The position has become even more confused because some breeders, without even batting an eyelid so to speak, have transferred an earlier name

to a later and quite different variety bred by them, even though the former is not yet completely extinct.

THE FUTURE OF ROSE BREEDING

It is sometimes asked: 'Is it necessary to go on breeding more roses when thousands of varieties exist, some of them of great merit?' Dean Hole, the father figure of the rose world at that time, asserted in *A Book About Roses*, published in 1870, that 'the Roses of today exhaust all our powers of admiration, our finite appreciation of the beautiful. The Roses of tomorrow can do no more'. Can we really say, after a century of rose breeding, that the present-day roses are more beautiful than those grown and enjoyed by Dean Hole and the rose-lovers of his time? It would be difficult to be dogmatic about this, especially when, as has been said, beauty is in the eye of the beholder! And after all, the great man of the roses did not state that the rose blooms of the future could not be more beautiful: he was referring to our capacity for being moved by the beauty of the blooms. Whether or not we deem the rose varieties of the present day to be an advance in loveliness compared with those of a bygone era, we certainly have now, as if in answer to the orisons of rose enthusiasts, a much richer spectrum of flower colours, shades and hues than at any previous time in history. There is also a further refinement in the shape and form of the large-flowered types and a remarkable assortment of rose fragrances because of continual crossing between a wider range of varieties (including some species crosses).

While many fine roses exist and many have passed into oblivion, the quest for perfection must go on. There are still many characters we would like to see in the garden roses—greater vigour and hardiness, resistance to diseases and pests, and new colours not yet obtained, like true blue. In many cases, while we already have the characters we look for, they are found scattered in a number of varieties. The rose breeder's task is to unite as many of them as possible into a single variety. Thus he endeavours to combine the exquisite shape of the bloom of the Hybrid Tea with the ever-blooming character of the Polyantha and the Floribunda, the unfor-



63. 'First Prize' (H.T.)

Very large, high-centred flowers are a deep pink but the centre soon becomes shaded with old ivory. Very dependable exhibition variety, one of the best to be introduced in recent years. In the photo above, the camera is looking into the heart of an opened flower.



64. 'City of Panjim' (H.T.)
An impressive luminous-pink and off-white bicolour. Fragrant.



65. 'Esmeralda' (Fl.)
Large, deep pink, blended with lighter shades. Beautiful shape with reflexing petals.



66. 'Mechak' (H.T.)

One of the darkest, velvety deep-red Indian varieties. Every flower seems to come perfect. Though very dark, the colour is not dull.



67. 'Bhim' (H.T.)
Very large, dark-red flowers are borne on a vigorous bush excellent for bedding.



68. 'Parthenon' (H.T.)
The white flowers with pink edges are particularly lovely.

69. 'Pasadena' (H.T.)
Brilliantly coloured, this orange variety is popular as a cut flower.



70. 'Surkhab' (H.T.)

Deep velvety-red with a white reverse, and fragrant. The photograph is that of a pot-grown plant.

gettable fragrance of 'General MacArthur' or 'Hadley' with the much-desired colour of 'Super Star' or 'Doris Tysterman'.

It is probably correct to say that rose breeding until a few years ago has been conducted largely on empirical lines. But already the genetics, i.e. the mode of inheritance of the various characters, of the rose plant is being studied, as also the basic cytology. Scientists are conducting research on the amount of pollen present in flowers of different varieties, and its viability and potency as judged by seed-setting. The biochemistry of the colour pigments is now better understood; the essential oils responsible for the fragrance of roses are likewise being studied. Therefore, with scientific advances in a number of directions, rose breeding is becoming more and more scientific, and the improvements in technique should enable the breeder to utilize, for instance, some of those wild rose species which so far have not contributed to the wealth of our gardens.

Therefore, for a long time to come the rose-lover can look forward to the yearly thrill of receiving profusely illustrated attractive catalogues and growing some of the latest roses in his own garden and savouring the joy of a new colour, or a subtly new fragrance.

In the United States, and also in some Continental countries, a new rose variety can be patented. More recently, the United Kingdom also has taken steps for the protection of the interests of the plant breeder. In these countries the rose varieties patented under the laws in vogue can be sold only under certain conditions. This makes it possible to collect a 'royalty', which affords some compensation to the breeder of a variety which has proved successful, and perhaps even become a best-seller. It should be noted, however, that the mere fact that a rose has been patented is no indication of its intrinsic quality, and a patented rose is not necessarily better than one which is not.

The introduction of a new rose to the buying public is a long and costly affair, and many rose breeders find it convenient to interest one of the commercial rose firms to sponsor and popularize their productions.

The next section goes into a certain amount of technical detail for those interested in the scientific basis of rose breeding.

GENETICAL ASPECTS

The improvement of plants and animals since the early years of the present century has developed into a precise technique, replacing the intuitional approach of the breeders of earlier generations. This advance we owe to the knowledge of genetics, a basic science whose foundation was laid about a century ago by Gregor Johann Mendel, an Austrian monk, whose experiments with garden plants have revolutionized agriculture. Mendel established through his studies what determines the various characters of a living organism, and how these determinants are transmitted from the parents to the progeny.

It is true that plants like the rose have received little attention at the hands of geneticists, and it may be argued that some of the not-so-scientific nurserymen have not done so badly. While full credit must be given to these dedicated persons, it may be emphasized that the possibilities of rose improvement are by no means exhausted. The range of variability, which is of potential value in the development of new varieties possessing characters not commonly found, is very great, and most of it remains unexploited. As Dr Ann P. Wylie indicated, genetical aspects will have to be taken into consideration if this wealth of untouched material is to be used meaningfully by planning crosses in a way which will avoid unproductive hybrids and result in economy of time, effort and resources. Greater use must be made of the large number of rose species hitherto unexploited because of sterility in wide crosses and related problems, using the recent spectacular advances in molecular biology, genetic engineering and biotechnology. This approach will provide useful guidance to those who wish to break fresh ground in rose breeding.

Hereditary Factors, Dominant and Recessive Genes

The role of genetics in improving plants, including the rose, is not difficult to appreciate with our present knowledge of the factors controlling the various traits of an organism, such as the colour, form and size of flowers. Mendel showed through his hybridization experiments with peas that hereditary factors exist in the form of particles which we now call genes and which are present in all the

cells of an organism, including the sex cells, through which they are transmitted from parents to the offspring. Many of the simple characters of an animal or a plant are each determined by a single gene, which of course is present in a double dose, one contributed by the male parent and the other by the female parent. These two doses of a gene may be alike or they may be dissimilar if the particular gene occurs in two or more forms. Many of the genes, in fact, commonly occur in two different forms; of these, one may be 'dominant' over the other. In the presence of the dominant form, the other form, described as the 'recessive', does not express itself. In peas, for instance, the height of the plant is controlled by a single gene, whose dominant form gives tall plants and the recessive form gives dwarf plants. When a plant has received the dominant gene from one parent and the recessive from the other, it will be tall because of the effect of dominance. This, however, does not mean that the recessive gene is lost for ever. It only means that it is suppressed for the time being, and one must wait for it to be passed on through the sex cells to a plant which has received a similar recessive gene from the other parent also. When this happens, the recessive gene expresses itself, and a character which had hitherto remained masked shows itself.

Two Important Recessive Genes

The occurrence of genes in different forms is of particular interest in the history of the rose plant, for, as emphasized by Dr C.C. Hurst, it was the presence of one such recessive in varieties of Chinese origin which brought about a revolution in the cultivation of rose varieties in Europe and in other parts of the world. The duration of flowering in roses is determined by a gene which in its dominant form restricts blooming to once a year. The recessive form of this gene giving a far more extended period of flowering is obviously of very great importance, but it was not available to the European rose breeders till its introduction nearly 150 years ago in the 'gene pool' of some Chinese varieties. The transfer of this gene into European varieties through hybridization was an event whose importance in increasing the popularity of the rose is not difficult to appreciate.

A development of comparable magnitude marked the advent

of another recessive many years later. This was the gene responsible for the production of the pigment pelargonidin. The more common rose pigment is cyanidin. As pointed out by Dr Wylie in her Master's Memorial Lecture*, this recessive factor brought in a new range of flower colours in the form of brilliant orange hues, not found in garden roses before 1930.

It was pointed out earlier that a large part of the available variability in the genus *Rosa* has not been tapped so far for bringing in new characters. It may be expected that several recessive (and also dominant) genes which may make significant contribution to the improvement of garden roses are available in this material. They may bring in resistance to diseases or improve the quality in other respects, and with the present knowledge of the genetic mechanism it should be possible to plan their incorporation into the cultivated varieties on a more systematic basis.

Chromosomes in Relation to Sterility

The Mendelian theory, with its emphasis on the particulate discrete nature of hereditary determinants, indicated clearly for the first time that it is possible to combine the desirable characters of two parental plants into a single individual through a simple breeding procedure. However, there is an important limitation to such a recombination of genes from different sources. The hybrid produced by the crossing of two plants may not always be fertile. In the genus *Rosa*, hybrid sterility of this nature has been an important factor conditioning the development of new types, and it is something with which the rose breeder of the future will be increasingly concerned. Fortunately, however, cytogenetical studies of a number of investigators, more particularly those of Hurst and Wylie, have indicated the causes of this sterility and the ways of overcoming it.

The genes, which determine the various characters of an organism, run into thousands, and yet they have to be transmitted to the progeny in a precise and balanced manner. The deficiency of even a single gene may prove lethal. For convenience in transmission and

* *Journal of the Royal Horticultural Society*, Vol. 80 (1955).



71. 'Delhi Princess' (Fl.)
Cerise-red buds open to sparkling pink flowers in clusters. The H.T.-type flowers are produced in great profusion. One of the popular Indian-bred varieties.



72. 'Scania' (Fl.)

Deep-velvety-red, H.T.-type flowers tend to be produced in singles on long stems in winter and in clusters when the weather warms up. This variety from Holland deserves to be more widely grown.



73. Seedling No. 80-17-3 (Fl.)

"... And the first glow of sunrise and the last sigh of sunset" – from Radice's translation of a Tagore poem.

This H.T.-type Floribunda was raised from a 'Queen Elizabeth' cross.



74. 'Madhura' (Fl.)

From a cross between 'Kiss of Fire' and the very old variety 'Goudvlinder', this charming H.T.-type Floribunda has very glossy leaves inherited from the pollen parent.



75. 'Saroja' (Fl.)

Cherry-red and white, H.T.-type, this looks like an attractive Floribunda version of the famous 'Rose Gaujard'. One of the outstanding recent Indian varieties.



76. 'Golden Rays' (Fl.)

One of the more outstanding yellow varieties, it derives its attractive colour from one of its parents, 'Whisky Mac'. The large H.T.-type flowers are of good shape and borne singly or in small clusters on a vigorous upright plant.

77. 'Fugitive' (Fl.)

A seedling of 'Mrs Oakley Fisher', well known in a bygone era. The flowers are in large clusters, and the colour rapidly changes from amber-orange to light yellow and, finally, creamy-white. A favourite with pollen-plundering bees as the picture above shows.



78. An arrangement of roses

The well-known flower expert Mrs Uma Rao created this rose arrangement using 'Bellona' (above) and 'Whisky Mac'.

for other more important reasons, genes are found grouped together into units of bigger size, which we call chromosomes. The basic number of chromosomes in roses is 7, and several important species of Asian origin which have contributed significantly to the development of such famous groups as the Hybrid Perpetuals and the Hybrid Teas, are diploids, having 14 chromosomes (7 maternal and 7 paternal). These include *moschata, gigantea, multiflora, wichuraiana* and *chinensis*. A number of Western species with which these Asian diploids crossed to yield several modern groups of roses are tetraploids, with 28 chromosomes. These, which had their chromosome number doubled during the course of their evolution, whose record we do not have, include *gallica, foetida* and their derivatives such as *damascena* and *centifolia*. One of the more important crosses involving these species of diverse geographical distribution was that between *gallica* and a variety combining in it the genes of *chinensis* and *gigantea*. The hybrid arising directly from this cross was a triploid, having 21 chromosomes, 14 from the European parent and 7 from the Asian. This imbalance made it sterile and restricted its utility; but plants with 28 chromosomes arose spontaneously from it. They were fertile and gave rise to the Hybrid Perpetuals with the further incorporation of some *damascena* genes.

A triploid origin has also been shown for the Hybrid Teas, which followed and replaced to a large extent the Hybrid Perpetuals. The Hybrid Teas were derived from a cross between the tetraploid Hybrid Perpetuals and a diploid variety of the Tea roses which combines in it the genes of three Asian (*moschata, chinensis* and *gigantea*) and one European (*damascena*) species. As in the case of the Perpetuals, tetraploid varieties were spontaneously obtained from the original triploid hybrid; this restored the fertility of the plant, making it possible to obtain many different combinations of genes in its progeny.

The condition of triploidy resulting from the crossing of diploid and tetraploid parents, associated as it was with hybrid sterility, delayed the release of gene combinations which were destined to develop into our modern groups of roses. Not all triploid hybrids, however, had to wait for a change to the tetraploid level before their usefulness could be appreciated. Some of them were so

outstanding in their own right that they found immediate favour. These include several members of the well-known group of Climbers obtained from the crossing of diploid *wichuraiana* and the tetraploid Hybrid Teas. They also include several members of the Hybrid Musk group, including the varieties 'Penelope', 'Felicia', 'Francesca', 'Nur Mahal' and 'Vanity'. There are also examples where a cross involving a diploid and a tetraploid skipped the expected condition of triploidy and gave rise to the tetraploid state directly through an abnormal behaviour of the diploid parent, which passes its entire complement of chromosomes to its sex cells in place of only half the number, which is the normal practice. A particularly good example of this is provided by the variety 'Eva', obtained from a cross of the diploid 'Robin Hood' and the tetraploid 'J.G. Thornton', which is a Hybrid Tea. 'Eva' has subsequently been the progenitor of several of our modern rose varieties such as 'Fashion', 'Ma Perkins', 'Bonn', 'Berlin' and some varieties of German origin.

The role of chromosomal studies in rose breeding is evident from the evolutionary history of some of the more important groups described above. Unlike his predecessors, the breeder of the future can make use of considerable information on the chromosomal constitution of important parental lines and plan his crosses more hopefully. At a more sophisticated level, he can make use of the techniques which are now available for altering the chromosome number.

Bud Sports

Hybridization of different species has been primarily responsible for the evolution of new groups of roses. A second genetic mechanism which has been particularly important in increasing the range of variation within a group, and sometimes also in giving rise to a new group, may now be considered. The genes and chromosomes as would be expected are normally very stable. They do, however, undergo rare changes in their structure, resulting in mutations and accounting for the process of sporting. Bud sports have been an important source of variation in horticultural plants because of the ease with which they can be isolated and vegetatively propagated.

One of the most useful bud mutations in roses has been that

responsible for the induction of the climbing habit in the Hybrid Teas. This mutation in a single step made it possible to have all the desirable characters of the highly evolved Hybrid Teas in the group of Climbers. The significance of this fact can be more fully appreciated when we recall the magnificent climbing types of 'Crimson Glory' and 'Mrs Sam McGredy'. The Hybrid Teas have also produced many sports of normal habit, which, if not so spectacular, have been of considerable value in giving rise to new types. It has been estimated by Wylie that as many as 18 per cent of the varieties in this group introduced during a period of 25 years (1926–50) have originated as sports. These include 'Mme Butterfly', 'Lady Sylvia', 'Rapture', 'Better Times', 'Jewel', 'Royal Beauty' and others, which in their turn have thrown a number of other sports. This role of bud mutations is of some significance and holds out promise for the future, because with the advent of atomic energy in the recent years, a number of radiation sources which can induce mutations have become available.

Another group of roses which owes its wealth of variation to bud sports is the Dwarf Polyanthas. About 54 per cent of the total number of varieties in this group has been estimated to have had this mode of origin. They include, among others, 'Miss Edith Cavell', 'Coral Cluster', 'Juliana Rose', 'Locarno', 'Cameo', 'Ideal' and 'Little Dorrit'. Going back in time, one can recall other important bud mutations resulting in double-flowered varieties and the Moss rose, which was once popular in Europe.

The Pigments of Roses

No other part of the rose story has seen more exciting developments in recent years than that relating to the study of its flower pigments; nor does any other area of research on this plant hold out promise of greater rewards in the near future. We owe this advance to the brilliant studies of a Japanese scientist, Dr Kenichi Arisumi, who in a series of papers published between 1964 and 1967 made an outstanding contribution to the subject. His results provide full support to the statement made earlier that a scientific approach to rose improvement can be expected to give results far more impressive than anything which has been achieved so far.

To understand fully the significance of this work, it is necessary to refer to the two major developments on the increase in the range of flower colour in garden roses. The occurrence of a mutation in the Dwarf Polyantha class, which gave rise to the orange shades not found before, has already been described. It was explained then that this mutant gene showed its effect through the production of pelargonidin, an anthocyanin pigment not found in the varieties prevailing earlier. The second important source of such variation was the species *R. foetida*, which is well known for its deep-yellow flowers. This species was crossed with the Hybrid Perpetuals and through them to the Hybrid Teas in the early years of the present century. In the absence of a detailed analysis, it had been widely believed that the species *foetida* contributed to the Hybrid Teas an additional form of the anthocyanin pigment, just as the mutation earlier in the Polyanthas had introduced pelargonidin. But a detailed chemical study showed that the improvement in flower colour following the incorporation of *foetida* genes was not due to any anthocyanin pigment. Instead, these genes provided the basis for the production of an entirely different type of pigment known as carotenoid, which was directly responsible for the new shades. This appreciation of the role of the carotene pigments for the first time in the history of garden roses had important consequences; for it was soon realized that the combining of the pelargonidin of the Polyanthas and the newly found carotenoid of the Hybrid Teas should give new types of flower colours. Arisumi has already succeeded in bringing together these pigments through hybridization. According to him the flower colours thus realized for the first time are so brilliant that the like of them has never been seen before in garden roses. A number of these new varieties can be expected to be released in the near future.

Another notable effort which is being made now aims at the substitution of cyanin with paeonin. Both are different forms of the anthocyanin pigments. The first is far more commonly found in rose species than the second. It is well known, however, that paeonin, characteristic of the Poinsettia plant, gives a scarlet shade of a far deeper intensity than cyanin.

After Arisumi, important researches on the subject have been

conducted by De Vries and his co-workers (De Vries *et al.*, 1974, 1980), who determined the relative qualities of carotenoids, cyanidin, pelargonidin, quercetin and kaempferol in about 200 varieties and also some species. This was followed by a crossing programme to try and realize a larger and brighter range of flower colours. Again, important studies on rose-petal pigments have recently been reported by Marshall *et al.* (1983).

While there has been considerable progress in the study of flower pigments in the rose at a chemical level, not much new information has been added through genetical analysis. The previous findings in this regard have been summarized by Wylie. According to these, the dominant colour in roses is magenta-pink or tyrian-rose to rose-red. This pink is dominant to dark red and also to orange-yellow, yellow, white and scarlet. Deep yellow is recessive to light yellow and white is recessive to cream and light yellow.

Finally, a word about the blue roses, which are really shades of lavender, lilac or mauve. They aroused mixed feelings when they first appeared. In countries like Britain, the general reaction could perhaps be most aptly expressed in the exclamation of the Victorian dowager when confronted with Darwinism: "I pray that it not be true, but if it be true that it will not generally be known"!

Years later, however, with the coming of varieties like 'Sterling Silver' with its exquisitely shaped flowers of a very clear pale mauve accompanied by a lovely perfume, and the easy-to-grow 'Blue Moon' with, again, shapely flowers of a slightly deeper shade of lilac-lavender plus an attractive scent, acceptability of this colour group began to expand, particularly with flower arrangers.

There is still a yearning for the true blue rose and the quest goes on. Some people keep hoping that just as the pigment pelargonidin entered the rose-petal colour spectrum by means of a natural mutation, something similar would occur so that delphinidin, the pigment responsible for the striking blue colour of Delphiniums and some other flowers, becomes available to the breeders. This would of course entail a minor genetic miracle. But if it does happen, the first really blue rose would no doubt be greeted with hosannas by many, and the fortunate breeder would make a fortune.

CHAPTER 13

ROSES IN POTS

WHY grow roses in pots? For one reason, there are people who, living in flats and apartments, just do not have any garden space. So they fulfil their yearning for flowers by having a pot garden on the terrace or verandah, or wherever they can find a little room in the sunshine and air. Secondly, even those with enough ground space find it convenient to keep a certain number of pot plants because they can be moved about. One could thus make the best use of the limited area which is blessed with enough sunshine by bringing in pots, keeping them there for the plants to bloom, and then removing them to make place for something else that wants a place in the sun.

Many people in India grow foliage plants, ferns, cacti and succulents in pots, apart from certain annuals and shrubs. Roses likewise can also be successfully cultivated in pots. In fact, for the little Miniature roses this is perhaps the best way to grow and display them; small pots in various shapes, sizes and colours are available for the purpose. For the Hybrid Teas, Floribundas and the like, however, the pots must be large enough to afford sufficient space for the roots to develop; normally 30-35-cm. (12–14-in.) pots are adequate. Tubs can also be used. Both pots and tubs come in different shapes, and there is scope here for selecting something to suit particular requirements, especially if plants are going to be placed in a patio.

Soil for Potting Roses

For potting roses, the mixture may vary in different parts of the country. One which has been recommended in northern India is three parts of soil, one part of well-rotten manure, one part of leaf-mould and one part of wood-ash. It is desirable every year to remove the top 7.5-cm. (3-in.) layer of soil and add well-rotten manure. After

pruning, when new growth has begun, a pinch of sulphate of ammonia is a good tonic. Or, one of several proprietary powders and tablets that are available for stimulating plant growth can be used. After two to three years it is advisable to re-pot, i.e. transfer the plants to new pots; or better still, start with fresh plants.

Choice of Varieties

The choice of varieties is important. The best for potting are those which do not grow too tall, which grow and branch rather uniformly in all directions to give a 'well-rounded' plant, and which bloom profusely. The following are among the large number which can be recommended. There is ample scope for exercising one's predilections as regards colour, shape of bloom *et cetera*.

The Hybrid Teas

'Ashirwad'
'Brandy'
'Diva Swapna'
'First Prize'
'Flaming Sunset'
'Fragrant Cloud'
'Golden Afternoon'
'Helmut Schmidt'
'Homage'
'June Bride'
'Lady Frost'
'Maharani'
'Margaret Spaull'
'McGredy's Sunset'
'Michèle Meilland'
'Montezuma'
'Mrinalini'
'Paradise'
'Picture'
'Priyadarshini'
'Rajhans'
'Sabine'
'Sonia'
'Srinivasa'
'Virgo'
'White Masterpiece'

The Floribundas

'Arunima'
'Banjaran'
'Belinda'
'Bellona'
'Bhagmati'
'Chandrama'
'Charisma'
'Charleston'
'Chitchor'
'Delhi Princess'
'Europeana'
'First Edition'
'Flamenco'
'Iceberg'
'Judy Garland'
'Kumkum'
'Mercedes'
'Neelambari'
'Netravathy'
'Prema'
'Regensburg'
'Saroja'
'Shocking Blue'
'Summer Snow'
'Zambra'
'Zorina'

Besides the Floribundas just mentioned, some of the low-growing Floribunda roses like the so-called Garnette roses and the Talk roses are likewise very suitable for growing in pots.

Many of the Polyantha roses are suitable for potting, particularly that lovely pink-and-white 'Echo' and the delightful deep-pink variety with white eye carried on enormous airy clusters, 'Chatillon Rose'. The same applies to the Miniatures, practically all the varieties being suitable. Incidentally, Climbing Miniatures are also available and these too can be cultivated in pots. In addition, the newer group of roses referred to earlier in the book as 'the inbetweens', which are somewhere between the Floribundas and the Miniatures, can make attractive pot plants.

79. 'Banjaran' (Fl.)

The flowers are gold and flame-orange to orange-red, in well-spaced clusters, borne on a vigorous free-flowering bush. One of the most popular of the Indian-raised roses, it has been frequently seen in prize-winning entries at rose shows in this country.





80. 'Kumkum' (Fl.)
Brilliant scarlet flowers in small to large clusters make this an eye-catching Floribunda.



81. 'Playboy' (Fl.)

Striking scarlet-and-gold flowers are borne very freely on a vigorous plant with glossy leaves. This variety from Scotland truly brightens the garden.



82. 'Arunima' (Fl.)

Deep phlox-pink, very double flowers in freely-produced clusters make this one of the popular Indian-raised Floribundas.

83. 'Else Poulsen' (Fl.)

One of the very earliest and most successful of the new class of roses obtained through hybridization by Poulsen in Denmark between the Hybrid Teas and the Polyanthas. This variety with its well-spaced very large clusters of pink, 10-petalled flowers, is still grown in India.



84. 'Regensburg' ('Young Mistress') (Fl.)

One of McGredy's most charming "hand-painted" roses. The photograph above illustrates the remarkable featherings and pencillings which vary from flower to flower even in the same cluster.



85. 'Summer Snow' (Cl. Fl.)

White, semi-double, cupped flowers are produced in such profusion as to suggest a snowfall. A vigorous climber suitable for a climate like Delhi's, it can be trained on a pillar or a tree.



86. 'Judy Garland' (Fl.)

One of the brightest of all Floribundas. The flowers, which are borne singly or in small clusters, open in shining chrome-yellow, which soon becomes edged with flame-orange and finally turns into an orange-red. The glossy leaves are very attractive. Has done well in India.

CHAPTER 14

THE MINIATURE ROSES

THE Miniature roses, also referred to as the Baby or Fairy roses, are like pocket-sized editions of the larger garden roses. Although a dwarf form of the China rose was introduced into Europe nearly two centuries ago as the Pigmy or Lawrence rose, this class of roses has come into popularity only in the last few decades. For the smaller, more intimate gardens of today, the Miniatures have proved a boon. They cater to the demand for a perennial flowering garden plant which needs a minimum of space, and which at the same time is labour-saving. Neat and compact, they are little troubled by disease or very cold weather; also, they have a long blooming period—a gift from their China rose ancestry.

The early Lawrence roses were available in white, pink and red shades. In 1918 *Rosa chinensis* var. *minima* (*R. roulettii*) was discovered in Switzerland. But according to some authorities this was only a rediscovery of an old French rose, 'Pompon de Paris'. Be that as it may, this species has been used to breed some of the well-known Miniatures of today. As a result of hybridization, various colours are available today, and in some varieties, e.g. 'Baby Masquerade', the flowers change colour as they develop.

At present there is also a small group of dwarf Floribunda roses called Compacta roses, evolved in Holland, characterized by compact bushes bearing clusters of single flowers.

Use of the Miniatures

The Miniatures may be used as edgings or as borders; or they may be planted in rockeries or in pots, tubs or window-boxes. If one has a small courtyard with sufficient light and air, a remarkably dainty Miniature rose garden can be created. In it there would be small rose beds of suitable design, separated by strips of grass or

crazy paving. Standards of Miniatures can be planted, while Climbing Miniatures, which are also available now, like 'Candy Cane' and 'Nozomi', can embellish trellises and arches, all constructed according to scale.

As cut flowers, the Miniatures are something out of the ordinary. Varieties with rather longish stems and flowers like small Hybrid Teas are particularly useful for this purpose, e.g. 'Baby Gold Star', 'Pour Toi' and 'Rosina'. In arranging blooms of Miniatures it is well to remember that the containers used should be in proportion to the size of the flowering stems. The latter should be picked when the buds are just opening; they will then last for several days.

A sunny position is essential for potted Miniatures. If they are put in the shade, the shoots will lengthen and become lanky. However, pots normally kept outside may be brought into the house, when they are in full bloom, for a couple of weeks. It would be better even during this period to occasionally put them outside for short periods.

Propagation

Though the Miniatures can be grown easily from seeds, this practice is not recommended unless one is breeding new varieties, as the plants thus raised will show some variations from one another. The usual method is to make cuttings or to bud them; in both cases the methods described for the other garden roses will be applicable. Cuttings have the advantage that plants produced this way do not tend to become large and gross. This is an important consideration because one of the chief charms of the Miniatures is their petite character.

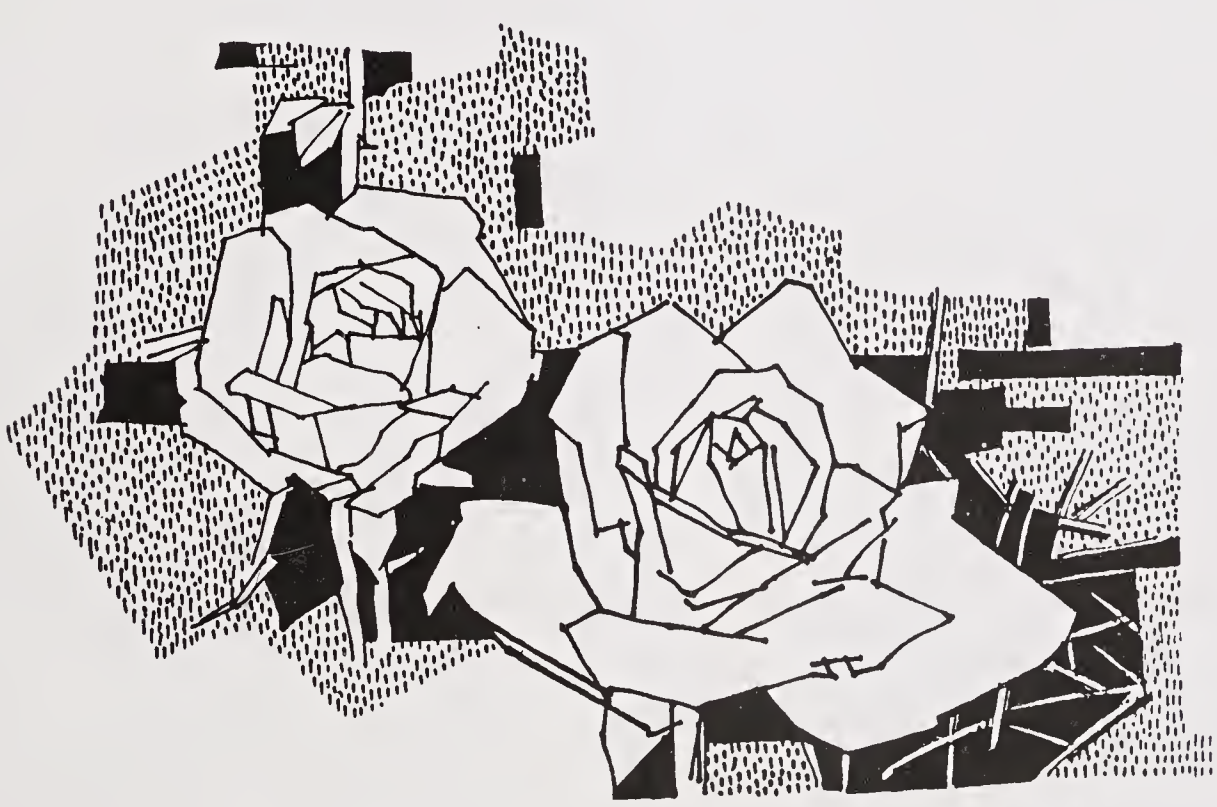
In Britain, when the budding method is used, *R. canina* is preferred because it is a naturally dwarfing stock.

Varieties

The Miniature varieties fall into two groups: those descended from *Rosa chinensis* var. *minima* (*R. roulettii*) have perfectly shaped flowers like very small Hybrid Teas, whereas those derived from the early Lawrence roses or which have one of the Polyantha Dwarf forms as an ancestor possess flowers resembling those of a Rambler.

There are many varieties to choose from because there has been a great upsurge in their popularity and rose breeders have been active enriching the rose world with a truly astonishing range of varieties. A few of the outstanding ones are

'Angela Rippon'
'Chandrika'
'Colibri'
'Cricri'
'Cuddles'
'Gloriglo'
'Green Ice'
'Holy Toledo'
'Jet Trail'
'Over the Rainbow'
'Party Girl'
'Puppy Love'
'Peek A Boo'
'Rise 'n Shine'
'Starina'
'White Madonna'



CHAPTER 15

RAMBLERS AND CLIMBERS

In India we probably do not make sufficient use of Climbing and Rambling roses. They are easy to grow, require little care except when spent branches have to be cut out once a year, and provide a big splash of colour. A well-grown plant of certain varieties carries thousands of blooms during each flowering season. In some varieties the individual blooms are quite fine, and they may also be fragrant. They can be used to cover walls, trained on pergolas, arbours and arches, and some make good hedges. A climbing rose over the front door makes the entrance to the house a thing of beauty. And how lovely is the view of the garden when framed by the filigree of flowering branches of a Rambler!

Most people do not know the wealth of varieties available, because our nurserymen stock only a small number of well-known kinds, to which have been added a few recent novelties. But in G.A. Stevens's book on Climbing roses, more than 800 varieties are described.

Good foliage is vital, particularly in the case of Ramblers and Climbers because it is on view for a much longer period than the flowers. J. L. Harkness has said: 'A climber must reach to the heavens and fall away to the earth, symbolizing aspiration and resignation.' Therefore, when selecting a Rambler or a Climber, do not forget to have a good look at the size and colour of the leaves, and assess how well they do or do not cover gracefully the space allotted to the plant.

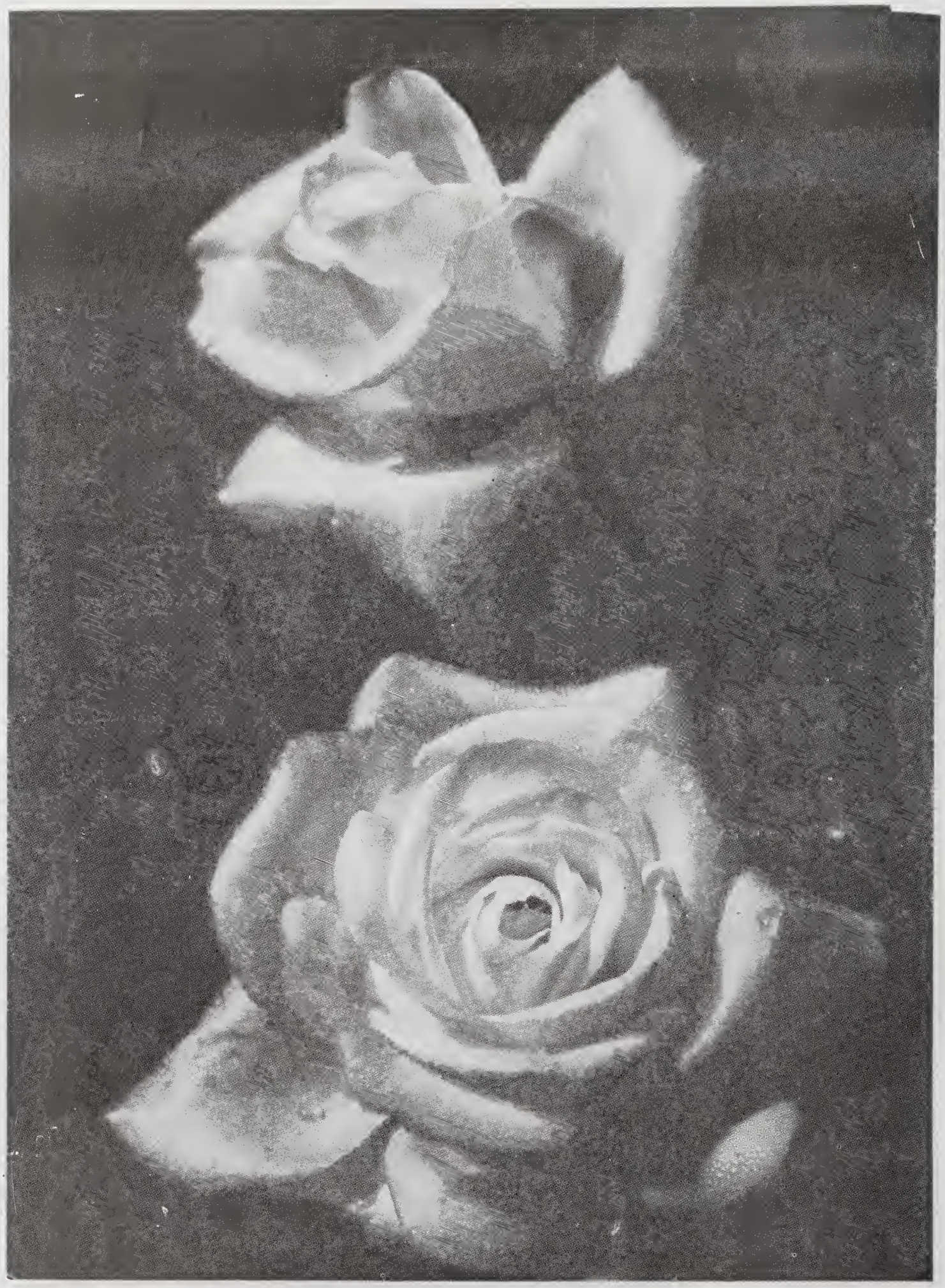
RAMBLERS

Although the words Climber and Rambler are sometimes used loosely as interchangeable terms, the Ramblers, strictly speaking,



87. 'Lamarque' (Cl.)

One of the best climbers for the plains, this Noisette rose produces flowers in clusters. Sweetly scented.



88. ''Dr Homi Bhabha' (H.T.)

The very large flowers, with up to 60 petals, are double and exquisitely shaped, and do not show empty centres. The plant stands up to low night temperatures as well as warm weather. Needs protection from thrips.

are a distinct class. The flowers in the Ramblers are borne in clusters, and the leaves are usually pale green, made up of seven or nine leaflets. There is only one flush of bloom during the year, but it lasts for several weeks and is so colourful that every garden should have a place for a Rambler, provided of course the climate is suitable. The Ramblers are the glory of the Indian hill stations in early summer. In the plains of northern India most of them, unfortunately, come to bloom only in early summer, when the hot winds are blowing, with the result that their story is a short and not always a glorious one.

The earlier Rambler roses were derived from two ancestral species, *Rosa multiflora* and *Rosa wichuraiana*. The Multiflora Ramblers are more cold-resistant, with large coarse foliage and thick canes, which are inclined to be stubby; they invariably produce clusters of bloom. One of the best known of the early Multiflora Ramblers is 'Crimson Rambler', introduced from Japan into England in 1890. Among the later ones, the thornless, pearly-pink 'Tausendschön' (meaning, Thousand Beauties) was well known at one time. The so-called blue Climbing roses have also come from this group, notably 'Veilchenblau' and 'Violette'.

The more important Ramblers, however, have been those which have originated from the hardy *Rosa wichuraiana*, a creeping rose from Korea. This species has shining leathery foliage and clusters of frilled, fragrant white flowers, borne on large flexible canes. Hybridization has given rise to many fine Ramblers including 'Albéric Barbier', 'American Pillar', 'Excelsa', 'Sanders' White' and 'Dorothy Perkins'. The last-named with its enormous clusters of small shell-pink blooms has, in spite of great susceptibility to Mildew, become one of the best-known roses in the world. A recent development are the forms which break away from the small-flowered clustered type, and which produce individual flowers as large as those of the Hybrid Teas. The first rose of this type was originated by Dr W. Van Fleet. Originally called 'Daybreak', it was re-named 'Dr W. Van Fleet'.

Famous Ramblers include the coppery-pink, large-flowered 'Albertine', which has been called the most beautiful of all the Ramblers, 'Easlea's Golden Rambler' and 'Emily Gray'.

CLIMBERS

Climbing Hybrid Tea Roses

Unlike those of the Ramblers, the flowers of many of the Climbing Hybrid Teas come singly, or in twos or threes. But the flowering is continuous, spread over the season. The plants are generally stiffer in growth but show quite a lot of variation in this respect. There are several kinds of the Climbers. Many of the well-known Hybrid Tea roses have sported or mutated to produce climbing types. Except for the climbing habit, there is usually no change in the flower or foliage characters. In some cases, however, the extent of flowering is said to improve. Thus, in the Indian plains the climbing form of 'Shot Silk' does appreciably better than the bush; so is the case with 'Peace'. In the case of 'Mrs Sam McGredy', a very popular rose in the recent past in the United Kingdom, the flowers are larger in the Climber.

If a Climber does not flower sufficiently, the stems or branches should be trained horizontally along wires or trellis work. This sometimes helps to stimulate flowering.

Noisette Roses

The origin of this group has been referred to earlier. Some of the most indispensable Climbers for the Indian plains come to us from the Noisettes. The fabulous 'Maréchal Niel' with its remarkably scented golden-yellow flowers is one of our best-loved Climbers and is still unsurpassed. Another, 'Lamarque', produces great clusters of creamy-white flowers with a delicate perfume. Other well-known ones in the past have been the pale-yellow 'Chromatella' (also known as 'Cloth of Gold') and the vivid orange-and-yellow 'William Allen Richardson', the buds of which were so popular for button-holes. The famous 'Mme Alfred Carrière' does not appear to be common in India.

Banksian Roses

Banksian roses, introduced from China into England in 1807, are well known in our country, especially in the hill stations. The

virtually thornless stems are covered with flowers once a year in a magnificent flush. Individual plants are known in England which have attained, in the course of time, a spread of about 25 metres (82 ft.) bearing more than 50,000 flowers at a time.

The white variety has scented flowers, the perfume having been likened to that of violets. The yellow form lacks fragrance but the colour is attractive. Both the white and yellow Banksian roses make attractive Weeping Standards.

Pillar Roses

Some Pillar roses with limited growth can be grown as bushes or shrubs, or used as hedges. They are also most attractive when trained to clothe a pillar about 2.5–3-metres (8–10-ft.) high. Some of the modern Pillar roses are outstanding and will flower more or less continuously through the rose season. Examples of this class are 'Coral Dawn', 'Danse du Feu', 'Golden Showers', 'Joseph's Coat' and 'Piñata'.

The well-known Kordesii group of recurrent-flowering Climbers may also be placed here. The group is named in honour of the great German rose breeder Kordes, who, working with 'Max Graf', managed to get a fertile amphidiploid seedling from this normally almost sterile variety. One of the best Kordesii climbers is 'Parkdirektor Riggers'.

Other Types

There are many other kinds of Climbing roses. As we have seen earlier, some of the wild species also have the climbing habit. Apart from these, rose breeders in Europe, America and Australia have been so busy hybridizing that the pedigree of some of the modern forms is quite complex. It would be confusing to try to give a complete account of the various groups and subgroups into which the Climbers can be classified. All that is attempted here, therefore, is to give a short list, arranged according to the colour of the flowers of the Climbers and Ramblers which may be considered especially useful for conditions in India and which are likely to be fairly readily available.

Recommended Varieties

Colour	*For Hill Stations*	*For the Plains*
White or nearly white	'Sanders' White Rambler'	'Delhi White Pearl'
		'Lamarque'
	'White Banksia'	'Prosperity'
Yellow	'Golden Showers'	'Casino'
	'Mermaid'	'Golden Showers'
		'High Noon'
		'Maréchal Niel'
		'Royal Gold'
Pink and pink blends	'Albertine'	'Compassion'
	'American Pillar'	*'Mme Driout'
	'Dorothy Perkins'	'Mardan Pink'
	'Mme Grégoire Staechelin'	(Also known as 'Anemone')
	'Zéphirine Drouhin'	*'Reine Marie Henriette'
Red	'Blaze'	'Clg Crimson Glory'
	'Paul's Scarlet Climber'	'Clg Etoile de Hollande'
		'Don Juan'
Yellow-and-red blends	'Cocktail'	'Cocktail'
Multicolour blends		† 'Joseph's Coat'
		† 'Piñata'
Orange-scarlet		'Clg Moulin Rouge'
		'Danse du Feu'
Mauve or violet	'Veilchenblau'	

*These are Tea varieties.
† These are Pillar roses.

Besides the above, a fairly large number of climbing forms of well-known Hybrid Tea and Floribunda varieties are available, e.g. 'Clg Angel Face', 'Clg Iceberg', 'Clg Landora', 'Clg Miss Harp', 'Clg Paradise'.

The Future Outlook for Ramblers and Climbers

Sadly, we in India seem to have entered a period which could

be referred to as 'the twilight of the Ramblers and Climbers'. While, one could come across a large number of Ramblers and Climbers till a few years ago, the number has been diminishing with alarming rapidity. One major reason appears to be that the villas and bungalows that provided great scope for the judicious planting of a few Ramblers and Climbers are being rapidly replaced by modern flats with little available space for a large Climber or two. Plant-lovers are therefore finding that most of them cannot do more than nurse a few pots of house plants including of course the cacti, which have come into high favour.

On a very recent quick survey in Delhi I found that some of the old Climbers are not yet extinct like the grand 'Maréchal Niel' and 'Lamarque'. Another, 'Aimée Vibert' introduced by Vibert in 1828, which was once popular in the eastern parts of the country, and is usually included among the Noisettes, also survives. Likewise, if one searches, there are a few plants of old favourites like 'Mme Driout', 'Reine Marie Henriette', 'Clg Mrs Pierre S. du Pont', 'Clg Shot Silk' and even 'Crimson Rambler'. But they are obviously 'on their last legs' and will disappear unless at least one of our major public rose gardens or a research institution working on roses moves swiftly to secure budwood and raise new plants to decorate arbours, arches, pergolas and walls.

The Pillar roses with their limited growth are not quite in such danger, and those with profuse dazzling blooms like 'Joseph's Coat' and 'Piñata' are quite popular. They can be trained up pillars or tripods in the larger gardens or to provide just one 'accent' plant in a small one.

CHAPTER 16

THE SHRUB GARDEN

ALTHOUGH in a way all roses can be said to be more or less shrubby, the term Shrub roses is best reserved for those which are neither the ordinary types grown in beds nor the true climbing and rambling forms. Shrub roses are normally too large to be grown in beds, and are best used as specimen plants or in small groups. They can also be mixed with other plants in a shrubbery, though this must be done judiciously to get the best results. While the Shrub roses form a conveniently recognizable horticultural group, there is no scientific sanction behind it. In fact, roses from many diverse groups, both wild and cultivated, can be called Shrub roses. They should, however, possess adequate size, be well clothed with leaves, and look handsome even when not in bloom.

Wild Roses

A large number of wild species are found in various parts of the Northern Hemisphere; most of them have single flowers, usually fragrant, followed in some cases by colourful fruits or hips. The plants flower only once a year, but the blooms last for several weeks and can be most spectacular. Most of them are armed with thorns and prickles and are deciduous, i.e. the leaves shed before winter. Among the large number available, only a few outstanding ones are described below. It should be remembered that these are likely to succeed only in cool climates.

Rosa moyesii

Introduced into Europe from western China in 1908, it at once received acclaim as one of the finest of flowering shrubs. This is a tall species, forming a canopy of small, dark-bluish-green leaves. The flowers are of intense blood-red colour, with dark stems, and are

produced in small clusters. After the flowering period is over, there is again a contribution to garden splendour, for the bush is covered with large flagon-shaped fruits of a rich scarlet-red colour.

A garden form of this species, named 'Geranium', is more compact, with flowers of a striking blazing red, while the hips are even larger than those of *R. moyesii*. This is therefore more suitable for gardens of average size. A hybrid of *R. moyesii*, 'Eos', has nearly single flowers of coral-red with yellow stamens, and gives a most brilliant display.

Rosa eglanteria (*R. rubiginosa*)

Also known as the Sweet Briar or Eglantine, this has clear-pink flowers of beautiful shape and delicious fragrance. The foliage also is aromatic, especially in warm moist weather. After the flowers, the large quantities of hips are most ornamental. The bush is heavily armed with hooked prickles and makes a hedge which is both beautiful and impenetrable.

Rosa rubrifolia

The shrub reaches to a height of about 2.5 metres (8 ft.) and is valued especially for the colour of the foliage. The leaves, which have a glaucous covering, are grey-green with a touch of mauve in shady situations, while in sunshine they develop a rich coppery-mauve tint. The clusters of flowers are pink with a white central area and have light-yellow stamens. The fruits are brownish red.

Hybrids

The number of hybrids between wild species and the cultivated forms, and among the cultivated types themselves, is legion. It is possible to give only a few examples out of the wealth available.

'Nevada'

Said to be a cross between *R. moyesii* and a Hybrid Tea rose, this is considered to be one of the most magnificent of Shrub roses. It forms a bush about 2 metres (7 ft.) high and even wider in diameter, with branches in great sprays. The 10-cm. (4-in.) flowers, which are creamy white with pink tints, or even pink in warm weather, cover the bush in their hundreds and afford a most beautiful spectacle.

'Frühlingsgold'

Raised by Kordes from a cross between the wild species *R. spinosissima* var. *hispida* and a Hybrid Tea rose, this is one of the best of the more modern roses. The handsome shrub when in bloom is completely covered with nearly single, large flowers of butter-yellow colour and richly coloured stamens, having a remarkable fragrance which lingers in the air. Sometimes it gives a smaller second crop of flowers in September. Another hybrid called 'Frühlingsmorgen', involving *R. spinosissima* var. *altaica*, from the same raiser, is also extremely beautiful. The flowers are single and have a clear rose-pink colour passing to pale yellow at the centre, where the stamens and their filaments are maroon-coloured.

The Hybrid Musks

This name is given to a group of roses which, while coming from several sources, possess a number of common characters so that they form a distinguishable horticultural group. The name, however, is misleading, as their connection, if any, with the Musk rose, *R. moschata*, is remote. The Hybrid Musks are usually very fragrant, the fragrance being carried by the air over a fair distance. The plants have long branches and can be used as Pillar roses if desired. Many of the Hybrid Musks grow well in the plains of India, one of the most successful being 'Prosperity'. The following are among the more important.

'Felicia': This forms a well-shaped compact bush and also makes a fine hedge. The buds are well shaped and of a warm-apricot-pink colour, while the open flower is silvery pink. It is a very showy variety.

'Penelope': Another fine variety, with salmon-orange buds opening out to lovely creamy-pink or pearl-white flowers in strong light. The clusters are very large and the musky fragrance really strong.

'Prosperity': This produces large clusters of creamy-white, many-petalled blooms, sometimes with a blush-pink or lemon shading. The buds are often tinted with creamy pink. Since the growth is not too strong, 'Prosperity' can also be used for making handsome Weeping Standards. A seedling of 'Prosperity' raised at Delhi, called



89. A Weeping Standard (Banksian rose)
The well-known Banksian roses produce a magnificent flush of flowers once a year on virtually thornless stems, and make attractive Weeping Standards for the plains.

90. 'Half-standards of 'Iceberg' (Fl.)

Undoubtedly one of the best Floribundas, this famous variety from Kordes of Germany puts forth trusses of small, white, very fragrant flowers. Exceptionally healthy foliage, borne on vigorous bushes, makes it a fine Half-Standard.

91. Half-Standards of 'Molly Sharman-Crawford' (Tea)

A much-loved Tea rose valued for its freedom of flowering, it can be made into a charming Half-Standard.

'Delhi White Pearl', has extra-large trusses of flowers.

'Vanity': It is a large plant which is somewhat gawky if grown alone but is very effective when grown in an intertwining group. Crimson buds and almost single, clear-rose-pink flowers with strong fragrance cover the plant, which is continuously in bloom.

'Kassel': 'Kassel' is a vivid bush with huge clusters of dusky-flame-red flowers.

Other Kinds

Some varieties classed as the Hybrid Perpetuals, Hybrid Teas, or even some of the tall-growing Floribundas or the less-rampant Climbers can be used as shrubs. Among them are the redoubtable 'Snow Queen' or 'Frau Karl Druschki', 'Folklore', 'Fugitive', and 'Cocktail'; and from the 'old-fashioned' group of roses, 'Souv. de la Malmaison', 'Mme Pierre Oger' and 'Mme Hardy'.



CHAPTER 17

THE STANDARD ROSES

THE Standard roses, or Tree roses as they are called in America, are the aristocrats of the garden. They not only relieve the monotony of a lay-out consisting merely of bushes of somewhat equal height but give an air of distinction to the whole garden. What is more delightful than a walk bordered by Standard roses? A single Standard, or a small group of two or three, can make that 'difficult' corner a place of beauty. Their blooms can be enjoyed at eye-level and the perfume inhaled without stooping , a matter of some importance to the obese and the elderly.

Some people think that the Standard roses are distinctive varieties in themselves: that is not so. Any rose variety can be budded high up on an upright stem of the stock to make a Standard rose or Tree rose. But not all varieties are equally suitable for the purpose. The best are those which, besides being floriferous, make a uniform growth all round, and branch sufficiently and compactly to produce a reasonably symmetrical head, crowned with flowers. Some people bud more than one variety on a Standard to create a multicoloured effect. For those who care for this sort of novelty, one precaution to be taken is that the varieties so combined should be of rather uniform growth and their flowering periods should synchronize.

The main classes of the Standard roses are as follows:

Full Standards

These are budded at a height of 90 to 100 cm. (3 to 3 $^{1}/_{2}$ ft.). Many varieties can be used, and preference is a matter of personal taste. Among those which have been specially good in my experience are the following:

The Hybrid Teas
'Avon' (red)
'Charles Mallerin' (very dark-velvety red)
'Crimson Glory' (dark red)
'Golden Giant' (deep yellow)
'Helmut Schmidt' (luminous yellow)
'June Bride' (creamy white)
'McGredy's Sunset' (yellow with orange flush in cool weather)
'Michèle Meilland' (pearly pink)
'Montezuma' (coral-red)
'Priyadarshini' (pink blend)
'Ranjana' (coral pink)
'Virgo' (white)

The Floribundas
'Akito' (white)
'Arunima' (pink)
'Charleston' (multicoloured)
'Delhi Princess' (warm pink)
'First Edition' (vermilion-orange)
'Iceberg' (white)
'Judy Garland' (deep yellow edged with orange-red)
'Little Darling' (yellow and salmon)
'Playboy' (multicoloured)
'Prema' (pink, edged deeper)
'Rumba' (yellow, edged red)
'Summer Snow' (white)
'Zambra' (orange)
'Zorina' (orange)

Half-Standards or Short Standards

In this case the budding is done between 45 and 60 cm. ($1\,^1/_2$ ft. and 2 ft.). Half-Standards bridge the gap between Bush roses and the Standards. As they need less room than the Standards, in certain conditions they are particularly valuable. While any variety can be grown as a Half-Standard, perhaps the most charming for this category are the Floribundas and Polyanthas. All the Floribundas named under Full Standards are equally suitable for use as Short Standards. Among the Polyanthas, 'Chatillon Rose' and 'Echo' are outstanding, especially the latter.

Weeping Standards

In this type the budding is done at 1.5 metres (5 ft.) or even higher if a suitable stem of the stock can be had. Climbing and Rambling roses are used, as their long branches can be made to 'weep' gracefully. 'Trainers' made of wire are used to trail the branches; otherwise the branches tend to grow out at too horizontal

an angle from the main stem.

Any of the Ramblers can be used as Weeping Standards but they are more suitable for cool climates. For the plains the Banksian roses are excellent; so are 'Delhi White Pearl' and 'Prosperity'. In the chapter on Planning the Rose Garden, suggestions have been made on how Standard roses can be used in formal and informal designs.



CHAPTER 18

HOW TO EXHIBIT ROSES

Rose Shows

Rose Shows are deservedly popular. They give an incentive to the enthusiast to put in that little extra effort which results in the magnificent blooms we see on the show-bench. They are equally beneficial to the rose grower who does not exhibit. Here, one can see a whole range of varieties, including the latest novelties, shown at their best. It is always difficult to visualize from a catalogue description what a rose may be like; at the Show, one can choose varieties on the basis of the specimens actually on display.

In India, in the past we have had to be content with a rose section in a general flower show. From 1959, however, the Rose Society of India has been organizing a separate Rose Show each year, in December. Later it also started arranging a Spring Rose Show, which takes place normally in the last week of March, when there is a tremendous amount of bloom in the gardens, especially in the Floribundas. These have aroused much interest, and more and more people are taking to the growing of roses. Rose Shows are also being organized in a number of cities, among the important ones being Bombay, Pune (formerly Poona), Hyderabad, Jaipur and Ranchi. These Shows are very popular and well attended by rose-lovers. Chandigarh has a Rose Festival every year in February in the famous Zakir Rose Garden.

The Schedule

If one proposes to take part in a Show—and there is no reason why the average gardener should not do so—it is important first to read the schedule carefully and understand the requirements. For Show purposes, roses are usually grouped, somewhat artificially of course, into a few broad classes. The following are those recognized

in the schedule of the Rose Society of India.

1. *The Hybrid Tea Roses*: This group now renamed as 'Large-flowered' in some European and American Shows, includes not only the Hybrid Teas proper but also the Hybrid Perpetuals, Teas, some of the so-called Grandifloras and other large-flowered types which produce a single bloom, or at the most a small cluster of roses on a stem.
2. *The Floribunda Roses*: This group now labelled as 'Cluster-flowered' in some Shows abroad, embraces all the Hybrid Polyanthas and other roses which are produced in clusters, excluding the Ramblers, Polyantha Pompons, Miniatures, and of course Hybrid Teas as defined above.
3. *The Polyantha Pompons*: These are often referred to as the Dwarf Polyanthas abroad and share the clustering habit of the Floribundas, but the flowers are usually smaller, though the spray or cluster is often bigger.
4. *The Miniatures*: These are easily recognized by the smaller size of all the plant parts and also of the flowers.

Specimen Blooms

The greatest interest in a Rose Show lies in 'specimen blooms' or 'exhibition blooms'. For these, the Hybrid Tea roses, in the broad sense referred to above, are used. Only certain varieties fulfil the requirements, which include large size, and a high-centred, full-petalled, urn-shaped or pointed, shell-shaped bloom, able to hold its exquisite shape for some time. Examples of suitable varieties for this purpose have been given in the chapter on How to Select Varieties. There should be only one bloom to a stem, and if side-buds appear they should be 'disbudded' or removed at an early stage when they are about the size of small peas. This will also help to increase the size of the remaining flowers. It is unnecessary to emphasize that the plants grown for the purpose of providing exhibition flowers should be given adequate fertilizer and watered regularly. When the flower buds are developing, liquid fertilizer or foliar feeding may be useful.

Specimen or exhibition blooms are required to be shown in boxes, vases or bowls, which are normally furnished by the organ-

izers of the Show. It is important to note the length of the stem required. In 'box' classes the stem may be short, but in others it should not, according to the specifications of the Rose Society of India, be less than 23 cm. (9 in.), except in the case of the Miniatures, where the minimum length of the stem should be 7.5 cm. (3 in.). While some Rose Societies elsewhere specify both the maximum and minimum lengths of the stem, the American Rose Society requires only that the stem length should bear a pleasing relation to the size of the bloom. Entries with too long or too short stems will be penalized.

The blooms must be at least half open and not more than three-quarters open, depending on the variety. Buds which have hardly begun to unfold and fully blown roses are not eligible unless there are special sections intended for them.

The foliage should be clean, healthy, and typical of the variety. The use of oil or similar substances for cleaning or polishing the foliage is not permitted.

Decorative Hybrid Teas

Many Rose Societies have some sections for 'decorative' roses. The term is used to include the Hybrid Tea roses which are extremely beautiful but do not have the size or shape necessary for the exhibition type. In practice, the dividing line between 'exhibition' and 'decorative' types is thin and varieties like 'Rina Herholdt' occasionally find a place in either. Nevertheless, some of the varieties that judges do not expect to see in the 'decorative' class are mentioned in the chapter on The Judging of Roses. In the 'decorative' classes (these should not be confused with classes for flower arrangement), even fully open blooms may be displayed, provided the variety used is at its decorative best at that stage.

Hybrid Teas with single or semi-double blooms, e.g. 'Dainty Bess' and 'Oriental Charm', should not be disbudded.

The Floribundas and Polyanthas

In the case of roses which have typically a clustered habit, the Show schedule will indicate the number of 'stems' required, as opposed to 'blooms' in the Hybrid Tea classes. The larger the spray

or cluster, the better it is, provided, of course, that it has only one stem and is well balanced.

The Floribundas, being an artificial class, include varieties with Hybrid Tea-shaped blooms, as well as those which open flat, showing their centres. The stamens in the centre of the flower should be fresh, showing their typical golden or other natural colour. The Floribundas and Polyanthas should be exhibited as naturally grown specimens, without disbudding. There should normally be not less than two pairs of true leaves below the flower spray. In some Shows, including those of the Rose Society of India, the Floribundas are divided into 'H.T.-type Floribundas' and 'Non-H.T.-type Floribundas', there being separate sections and prizes for each.

The Miniatures and Climbers

The Miniatures are displayed, like the cluster-bloom types, in the naturally grown condition, although it is not essential to have two or more leaves below the flower spray.

Large-flowered Climbers are displayed as one spray or bloom-lateral, i.e. the current-season side-growth from the main stem terminating in a cluster of flowers. A single spray or bloom-lateral would consist of only one of the bloom-laterals and not a portion of the main stem bearing one or more clusters. Small-flowered Climbers or Ramblers are seldom displayed for competition in Rose Shows.

Removing faded flowers in cluster-bloom types is permitted, but ugly stubs or scars must not be left.

When Should Roses be Cut?

In temperate countries, roses are often cut in the evening before the Show. If one has to take them to a distant place for the Show, then there is no alternative to this. But in the Indian climate, it is usually considered advisable to cut the flowers very early in the morning, i.e. as soon as there is a glimmer of light to enable one to distinguish the blooms. It is helpful to go into the garden the previous day and make a note of the flowers likely to be suitable for final selection the next morning. If, however, the number is very large and the time factor is pressing, the work can be spread by cutting the Floribundas and

Polyanthas the previous evening. These clustered types are able to retain their freshness for a considerable time in cool weather.

There is a growing practice of cutting very promising just-unfurling buds up to a week in advance and then storing them in a refrigerator. If this is done, a refrigerator with removable shelves which will provide enough space should be chosen; also it should be one with a thermostat so that the temperature is maintained within the desired limits. A temperature range of 1.7°–3.3°C. (35°–38°F.) is usually considered to be the best. It is important that the flowers are not allowed to freeze. The stems of the cut blooms should be dipped into clean water kept in a suitable receptacle. The receptacles (plastic tubes, dixie cups, etc.) should be placed in the refrigerator from which food-stuffs have been removed. The stem ends should be re-cut under water once every day with the help of a sharp blade to renew the water-absorbing surface.

Rose varieties differ very much in their ability to withstand refrigeration. The blooms of 'Avon', 'Christian Dior', 'Garden Party', 'Happiness', 'Super Star' and 'Virgo' can be kept in a refrigerator for several days without any damage. In the case of 'Heart Throb', the bloom actually seems to improve! Other varieties that can stand refrigeration reasonably well are 'American Heritage', 'Bel Ange', 'John F. Kennedy', 'Peter Frankenfeld', 'Dr Homi Bhabha', 'Blue Moon' and 'King's Ransom'. 'Toro' keeps its form and colour for a long period. There are a few varieties which do not seem to like the treatment at all. These include 'Papa Meilland', 'Show Girl' and 'Anvil Sparks'. They tend to lose their fresh colour rather quickly. It is worth while experimenting with other varieties to see which of them can be made use of in this way.

Protecting the Flowers

A few days before the Show, it is often advisable to keep the developing blooms under cloth, polythene or paper bags. Otherwise they may be damaged by exposure to strong sun, extreme cold at night, or by rain. In some gardens protection against damage by birds is also required. For instance, in Delhi the red-vented *bulbul* has a penchant for devouring rose petals and can spoil the blooms.

CHAPTER 19

THE JUDGING OF ROSES

ONE of the most important objectives of a Rose Show is to show how culturally perfect a specimen can be garden-grown. In some countries—for example, the United States—there are training courses for would-be rose judges. In India, unfortunately, at present we do not have such a facility, and it is usual to call upon some experienced rosarians to become members of the judging team, which usually consists of three persons. There may of course be several teams depending on the magnitude of the Show. Also, for the flower arrangement classes a separate team is necessary, because the expertise for judging flower arrangements may not be available with judges who are called upon to evaluate the other classes.

The ability to grow roses well is quite distinct from the ability to judge them at a Show. Even the ability to identify varieties of roses is by itself not adequate. The ideal rose judge is one who knows roses well, who is familiar with the points for judging a good rose as laid down by the organizers of the Rose Show, and who is able to assess rather quickly (the time for judging is always limited) the good points and the weak points of a particular exhibit, giving due priority to the characters of the flowers, the stem and the foliage. To fulfil this requirement he should be a person who has personally grown garden roses, or be engaged in their scientific culture, and he must know intimately the characteristics and the range of variability of a large number of varieties, especially in the main classes of roses normally represented at Rose Shows. He should be able to verify the correctness of the labelling of varieties. He should not only know the rules of the Society organizing the Show, but he must also know the technical requirements regarding disbudding, the question of the bud versus the bloom, and the ideal form, substance, colour, size, and so on, of individual varieties. Finally, he must obviously be a

person of high integrity who will be able to subjugate all personal likes, dislikes and biases.

Characteristics of a Good Rose

The basic problem is: what constitutes a good rose? The American Rose Society, as cited by C.H. Lewis in his excellent book on the subject of judging, describes a good rose in the following terms:

> 'The highest type of bloom is one which has form, size, brightness of colour, substance, good foliage and at the time of judging is in the most perfect phase of its possible beauty.'

Usually, a scale of points is laid down for judging specimen blooms (specimen blooms are the top-quality blooms of certain Hybrid Tea varieties of large size and high centres). The Rose Society of India, for example, following C.H. Lewis, adopts the following scale of points for specimen blooms exhibited in vases and bowls.

Colour	25	points
Form	25	points
Substance	20	points
Foliage and stem	20	points
Size	10	points

In the case of roses exhibited in boxes, no points are allotted for the stem and the foliage, except that a bloom showing a weak neck will be penalized.

Form denotes the shape of the bloom or the outer contour of the flower. When at its most perfect phase of beauty the specimen bloom is generally from one-half to three-fourths open; but in certain varieties with fewer petals, this phase may be between the one-third-open and the one-half-open stages. The best specimen blooms will usually have a sufficient number of petals which are arranged symmetrically in an attractive outline tending towards a high centre.

Regarding size, the specimen should be sufficiently well grown to attain the optimum size of the variety, but any hint of coarseness will detract from its attractiveness and it will not qualify for the full points for size.

The quality known as substance is more difficult to define. The

term refers to the quantity and quality of the component material of the petals. Texture, firmness and thickness—all contribute to good substance. The colour should be typical of the variety, but the judge must be able to make allowances for the variations which occur as a result of the differences in the growing conditions, not only at various places but in different seasons. For instance, at Delhi a variety like 'Michèle Meilland' will at times give an impression of soft pink only, whereas in another season there will be a distinct touch of apricot-orange in it. The colour should be fresh and not impaired by ageing, fading, intense sun or over-refrigeration. It should give the appearance of being translucent and should certainly not be muddy and dim. Abnormal pigmentation also will be penalized. Apart from this, the colour should be as brilliant as possible. Here it may be mentioned that the characteristics of the leaf and those even of the stem, such as prickles and thorns, should be carefully examined, as they help in the identification of the varieties where the flowers are somewhat similar.

Decorative Roses

There are some cases where it is difficult to decide whether or not a particular variety should be considered under 'decorative' roses. Yet, if we keep in mind the objective of this section, there should be no difficulty. For instance, one would not expect to see in this category blooms of well-known exhibition varieties such as 'Christian Dior', 'First Prize', 'Paradise', 'Peter Frankenfeld' and 'Super Star'. On the other hand, this would give an opportunity to exhibit varieties like 'Docteur Valois', 'Kanakangi' and 'McGredy's Sunset' which are glorious garden roses but which do not have the high-centred shape required for exhibition blooms.

JUDGING DIFFERENT CLASSES OF ROSES

In Rose Shows there is a grouping of rose classes in order to simplify matters. Thus, for Show purposes the expression 'Hybrid Tea roses' includes the Hybrid Teas, Hybrid Perpetuals, Teas, Hybrid Tea-type Floribundas and their like, but not the Floribundas, Polyantha Pompons and Miniatures. The next important large class,

the 'Floribunda roses', includes all Hybrid Polyanthas and other roses which are grown in clusters but not the Ramblers, Polyantha Pompons, Miniatures or Hybrid Tea roses as defined above. As mentioned earlier, in some countries abroad the older classification has been replaced by a new one, which differentiates rose varieties into 'Large-flowered', 'Cluster-flowered', etc.

The Hybrid Teas

The Hybrid Tea varieties with 5 to 8 petals, such as 'Dainty Bess', must be judged as naturally grown flowers and not as disbudded specimens. They are usually in clusters and should be fully open at the time of judging. In judging such varieties, the jurors should observe the stamens, which are the best indicators of freshness in any rose. Stamens stay fresh for a shorter period than even the petals, and when they begin to fold over, the specimen is losing its freshness and has thus passed its most perfect phase of beauty.

The Floribundas

In the Floribunda group the flowers, which are displayed and judged as naturally grown, are normally in clusters, for which the term 'spray' is generally applied. In recent years it has become the practice in some countries to divide this group into two types, namely the H.T.-type Floribundas and non-H.T.-type Floribundas. The Rose Society of India likewise does the same.

It is very difficult to define precisely the characteristics of a spray or to make any hard-and-fast rule that would be applicable to all varieties. The Rose Society of India has defined a Floribunda stem as a primary stem having two or more five-leaflet leaves at the base of the cane, above which many bud-eyes on the stem should have produced growth terminating in a cluster or clusters of blooms of approximately the same stage of development. In this group judging is done by a similar scale of points as in scoring the Hybrid Tea specimen blooms, except that under 'form' the inflorescence as a whole is considered. The spacing arrangement of the florets, the number of specimens in the proper stage and the overall attractiveness and beauty of the spray are considered. A high-quality spray would, apart from the quality of the florets, be symmetrical, well

balanced, as near perfect as possible and have the individual florets equally spaced when the inflorescence as a whole is considered. Again, the most desirable specimen spray is the one having the greatest number of fresh, fully opened blooms, several buds and a few between the bud and the full-bloom stages, but with no spent blooms.

An occasional spent bloom, however, can legitimately be removed when the spray is being prepared for the Show. But this must be done neatly so that no obvious scar or stub is left.

The judging of Polyantha Pompons is done in a way similar to that of Floribundas.

The Miniatures

In the case of the Miniatures the general principles discussed for the Hybrid Teas and the Floribundas also apply. The flowers must be at the peak of their attractiveness, with sparkling colour and in well-spaced clusters. It has already been mentioned that the length of the stem required for the Miniatures section is less than that for the classes with larger blooms, and it is important to remember that one of the charms of the Miniatures is their petite size in everything—in flowers, in leaves and in stems. If, by overfeeding, abnormally large stems with large leaves and flowers have been produced, these would be penalized.

CHAPTER 20

FLOWER ARRANGEMENT

PUSHING a handful of flowers into a vase does not make a flower arrangement. Although some of the flower paintings from ancient times demonstrate that floral arrangement even in those distant days had attained considerable perfection, it was limited to a select few. In the present century, and in the past few decades especially, the public has become more and more conscious of the elements of good design in flower arrangement. In fact in the affluent countries today flower arrangement has a rightful place in the scheme of interior decoration. Not only have vases and other containers been much improved by artists but various styles and shapes in the floral material are eagerly studied, colour harmonies or contrasts cunningly planned and much imagination exercised, so that many modern houses are brightened by most beautiful and artful flower compositions. In India there has been recently a marked increase of interest in the art of flower arrangement.

Types of Roses

Naturally, the basic principles of flower arrangement apply to roses also. But the queen of the flowers offers such an endless variety of shapes, sizes and colours, not only in flowers but in foliage and the type of thorns, that no one need be content with a stereotyped arrangement. Roses may be arranged in masses or in a linear pattern. One can use the classically beautiful Hybrid Teas , or the clusters of the Floribundas and Polyanthas, or the new delightful Miniatures. Some of the single varieties with only five petals, such as 'Dainty Bess' or 'Lilac Charm', can be extremely decorative. The foliage of some roses is especially handsome. In the case of one wild species, *Rose sericea* var. *pteracantha*, the large, flat, translucent thorns are an object of beauty, for on the young branches they give a red glow

when seen against light. Of course, the hips of the wild roses, produced in riotous abundance, can be extremely decorative.

Colour Harmony

While it is probably true that very few flower colours actually 'clash' in nature, certain combinations are more appealing, especially in indoor arrangements. Each person has his own ideas on the best colour combination. Some like harmonies of matching colours; others enjoy a well-chosen contrast. It is therefore dangerous to try and make rules. But the experienced flower-arranger usually follows some principles that are helpful. For instance, the larger blooms are best kept towards the lower portion and the smaller blooms and buds towards the top or sides. Again, dark colours give the impression of greater weight than light colours and are better towards the bottom of the arrangement.

The colour of the container is important, and normally this should not compete with the flowers for first attention. It should supplement and bring out the beauty of the flowers.

Japanese Arrangements

Roses can also be arranged in the Japanese style, so popular now in many parts of the world including India. Rose buds and blooms that are just opening are used in many ways, along with branches of trees. The Japanese regard the rose as an effeminate flower and prefer varieties that have soft colours and delicate contours.

Among traditional arrangements, those combining the rose and the pine are popular. The pine is likened to a stalwart warrior and the rose to the captivating maid.

Accessories

Nowadays, with the great interest in ceramic art, containers of artistic merit suitable for a wide variety of arrangements are available. Besides vases, bowls and the like, one needs certain other accessories. Among the most important of these are devices for holding up the flower stems in the desired directions. The most useful of all are the needle-point holders, so popular in Japan and



92. A group of Floribunda roses
A corner of the author's garden. 'Summer Snow' stands out.



93. A group of Floribunda roses
A portion of the author's first-floor terrace rose garden.



94. Polyanthas in pots



95. 'Vatertag' (Pol.)

Clusters of rounded glowing salmon-orange flowers produced in profusion and very beautiful shiny leaves make this a most attractive subject for planting in beds, borders or pots.



96. 'Echo' ('Baby Tausendschön') (Pol.)

One of the most charming and easy-to-grow Polyanthas. The flowers come in clusters, and the colour varies from white to pink, the pink blushes being deepest when the weather is coldest.



97. 'Chatillon Rose' (Pol.)

The elegant trusses of glowing-pink single roses with a whitish base are truly enormous. Tall and vigorous. Has a long blooming period.



98. 'Paul Crampel' (Pol.)

Deep orange-scarlet. This and 'Gloria Mundi', released a year earlier, were probably the first roses to appear with striking colour previously not known in roses.



99. A terrace garden in New Delhi

A view across the author's terrace rose garden on the first floor. The plants are grown in pots. At one end a cement trough accommodates some Floribundas and Polyanthas.

now also available in this country. For certain purposes crumpled chicken-wire is useful. Forked sticks are stuffed into the vase when more sophisticated aids are not available. The latter types are naturally best used only with opaque receptacles. There are also wire-cage holders available for long, thick stems. A half or one-third of a dried coconut shell, suitably perforated, makes a very handy aid to prop up flowers.

Mixed Arrangements

Roses can be used mixed with other flowers or foliage, but care should be exercised to see that they combine well. While exhibiting in a Rose Show, it should be ascertained whether the use of other flowers and foliage is permissible in the particular section. In some competitions, one is allowed to use figurines, toys, dry branches, etc., to interpret a particular subject. This affords a fine opportunity for the exercise of imagination and artistic inventiveness.

How to Make Cut Flowers Last Longer

Most flowers after cutting have a short life, especially when days are warm. Some recommend the addition of aspirin, salt, sugar, vinegar, etc., for prolonging their life. There is no scientific basis for their use. Flowers can be made to last longer by first cutting them very early in the morning or after sunset, and, secondly, by putting them immediately into water after cutting, for which it is advisable to carry a small pail of water when going into the garden. It is important to use a good pair of scissors or a sharp knife for cutting, and to make a slanting cut so that the water-absorbing surface is increased. The water must be clean.

Scientific investigations in recent years have led to the discovery of some chemicals which prolong the life of cut flowers, including roses, by retarding the respiratory processes. In Europe and America they are available under proprietary names like Bloomlife and Floralife. For those who wish to make up their own solutions, the following two formulas* are recommended in *The Complete Book of Flower Arrangement* by Rockwell and Grayson.

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* Reproduced from *The Complete Book of Flower Arrangement* by F.F. Rockwell and E.C. Grayson, by the courtesy of the World's Work (1913) Ltd, Surrey, England.

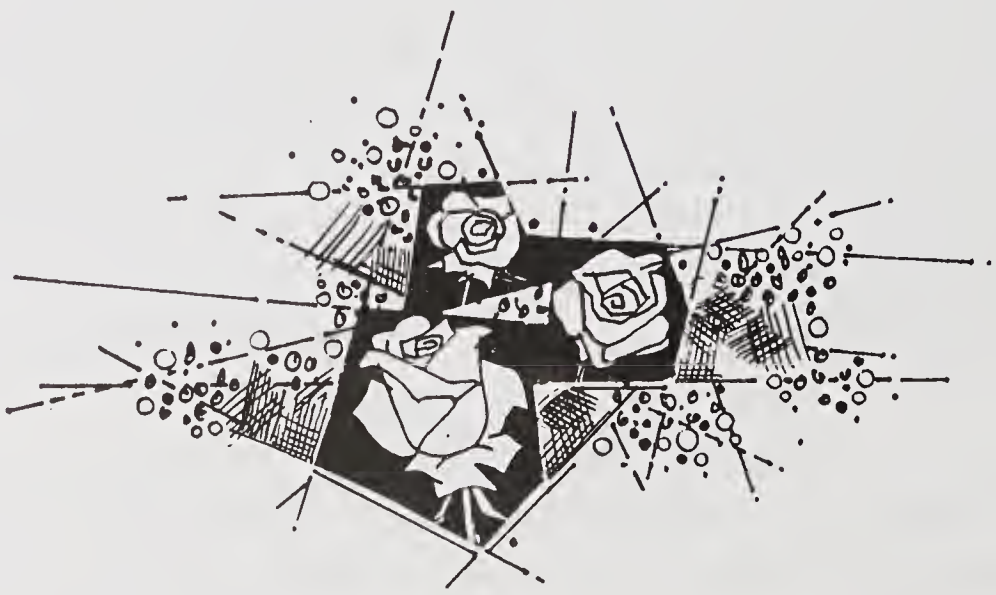
Formula 1: Make a stock solution of hydrazine sulphate by dissolving 1 ounce of it in 1 quart of water. Take $^1/_4$ cup to 3 gallons of water and to each quart of water add 2 tablespoonfuls of sugar. Roses, carnations, chrysanthemums, and many others, respond to this well. No daily changes of water are needed.

Formula 2: This formula is developed because of difficulties in obtaining hydrazine sulphate during the war. It serves as a satisfactory substitute. It consists of $^1/_4$ teaspoonful of alum (potassium aluminium sulphate), $^1/_4$ teaspoonful of chlorix (sodium hypochlorite), $^1/_{16}$ teaspoonful of ferric oxide, and 2 teaspoonfuls of sugar—all to 1 quart of water.

Suitability of Rose Varieties

With experience, one can choose the rose varieties most suitable. Though long-stemmed varieties are generally preferred for cutting, some short-stemmed ones can be very effective in shallow containers. Certain varieties even seem to intensify their colours under artificial light.

Rose petals look lovely in shallow bowls. Some people add a few petals to their finger bowls, thereby greatly enhancing their appeal.



CHAPTER 21

ROSE-WATER, ROSE-OIL, ROSE RECIPES

But the rose petals' dust belongs to the
Perfume-seller's heart.

– Abul Fazl, *Ain-i-Akbari*
Translated by H. Blochmann.

If one had to pick just one attribute that has endeared the rose to mankind, this would be, in the opinion of many people, its lovable fragrance. We have already considered the fragrance of roses, from the gardener's point of view, in an earlier chapter. Here we shall consider roses as sources of materials for the manufacture of rose-water and rose-oil; we will also give a brief consideration to other economic uses of the flower. The idea of employing the essential oils of certain flowers in perfumes was first conceived and technically employed in the Orient—in Persia, in Egypt, in India and in China. There are references in the Sutras and the Vedas to the use of perfumes in ritual functions. In a much later period it is reported that Queen Elizabeth I used Indian perfumes. For a long period, going far back into the past, India was renowned for the production of perfumes and allied products, both for internal consumption and for export.

Rose-Water

Rose-water has been valued from ancient times for use in making sherbets, and for various medicinal purposes. Even today rose-water is used in eye-lotions and eye-drops for its soothing qualities. At marriages and other social functions, rose-water is sprinkled on the guests.

Water distillation is a popular method for obtaining rose-water in India, because of the small size of the units. The distillation is carried out in a tinned copper still or *deg*, fitted with a false-bottom

copper condenser and a receiver. The condenser and the receiver are cooled with running water.

A weighed quantity of the blooms with calyces intact (long stems are avoided) is charged into the still by placing the flowers on the false bottom and out of contact with the boiling water. Water (about twice the weight of the flowers) is poured into the still and fire started in the receiver. The distillation period is about five hours from the time the fire is started.

In more modern stills handling a large quantity of flowers in a batch, the still is fitted with a steam-jacket and a closed steam-coil, and the flowers are distilled with saturated low-pressure steam to avoid over-heating.

Rose-water is priced on the basis of the quantity of flowers used in distillation and the unit value of the distillate collected.

Rose-water is used as perfume, for flavouring in syrups, soft drinks, tobacco and confectionary. As already mentioned, it is also used medicinally in eye-lotions. In India, it is widely used in temples and for sprinkling on gatherings on ceremonial occasions.

Rose-Oil (Otto of Roses)

The essential oil of roses (otto of roses) is not obtained directly from the distillate. Rose-water collected during the distillation is placed in shallow earthen or metallic vessels and exposed to the cold of the night air in the open, protected from dust with clean muslin cloth. Early in the morning the fragrant butter-like material floating on the surface of rose-water is collected by means of shells or feathers and stored in glass bottles. As the temperature rises, this becomes liquid and with ageing develops an amber colour.

For obtaining good-quality rose-oil and other products, the flowers are picked early in the morning before sunrise, as the percentage of volatile oil decreases with the advancing day. Flowers collected late in the day are used for making conserves, but not for rose-water, rose-oil or attar.

The credit for the discovery of otto of roses—the essential oil of the rose from which rose perfumes are made—is generally given to Nur Jehan, the Mogul Empress. This celebrated Queen used to fill the entire canal with rose petals, upon which she used to sail with her

husband, the great Mogul. The heat of the sun disengaged the essential oil from the liquid and because of the observation of some droplets floating on the surface by the keen eyes of the Queen, the discovery was made of the far-famed 'Attar of Roses' or 'Attara Jehangiri'. Emperor Jehangir himself, however, in his memoirs gives the credit for the discovery to the mother of Nur Jehan, Salima Sultan Begum.

According to Ibne Khal Doon, a well-established industry for production of rose-water was existing in Persia during A.D. 800–900 and Iran was the centre for production of rose-water apparently during A.D. 1600. Rose-water was a common item of trade between Iran, India, Spain, China and Europe. It should perhaps be explained here that while the term rose attar or *itr* has sometimes been employed as being synonymous with rose-oil or otto of roses, the correct usage is to limit it to describe an indigenous product prepared by distillating rose flowers and absorbing the perfumed vapours in oil of sandalwood kept in a receiver.

Kannauj, Jaunpur and Ghazipur, in Uttar Pradesh, were the reputed centres of manufacture of rose-water and perfume. In this connection it is interesting to recall Bishop Hebber's observation that 'Ghazepoor is celebrated throughout India for the wholesomeness of its air and the beauty and extent of its rose gardens'.

Unfortunately the flourishing position which India had attained in the ancient and medieval periods was gradually lost because of the lack of scientific knowledge and the inability of the Indian manufacturers to adopt modern scientific equipment and techniques, with the result that the essential-oil industry, particularly the rose-oil industry, is at present in a deplorable condition in India. Moreover, the development of rose cultivation and distillation on modern lines under government encouragement in several countries of the world has placed India at a disadvantage. Thus the old-fashioned manufacturing set-up in India has not been able to compete with improved methods of production based upon modern technology, backed by scientific floriculture, in countries like Bulgaria and France. Rose products, because of their present insignificant value and volume in trade, do not even find a mention in the statistics for essential oils in India.

Suitable Varieties

Although thousands of rose varieties exist, the following are the most important for the production of rose-oil for perfumery.

Rosa damascena (the Damask rose): It is characterized by large pink flowers, and is cultivated in Bulgaria, Persia and India.

Rosa centifolia (the Cabbage rose): The flowers are usually pink. This species is grown at Grasse, in France.

Rosa alba: This white-flowered variety stands up to cold, and is grown in some countries including Bulgaria.

Rosa gallica: It is usually cultivated in south Russia.

The oil obtained from varieties of these species is usually of high quality and of comparatively fixed fragrance.

The important varieties suitable for the production of rose-oil in India are: 'Bussorah' (also called 'Barwana'), belonging to the species *R. damascena*, and 'Rose Edouard' (also called 'Baramasi' or 'Chenia'), usually regarded as a Bourbon hybrid. 'Gruss an Teplitz' has been grown on a pilot-plant scale for experimental purposes.

In tests conducted at the Harcourt Butler Technological Institute, Kanpur, and also as a result of other assessments, it has been concluded that the essential oil from 'Bussorah' and 'Rose Edouard' is of good quality and almost as good as the Bulgarian otto of roses.

At present the chief centres where roses are cultivated for distillation are Hasayan and its neighbouring villages in the Aligarh District. On a smaller scale roses are also cultivated in Kannauj, Ghazipur, Kanpur, Sikandarpur (Ballia District) and Saharanpur, all in Uttar Pradesh. The largest area is in the Aligarh District, which has about 400 hectares (1,000 acres) devoted to the rose crop, with an annual production of about 7,400 quintals (728 tons). The yield per hectare is, however, much less than, for instance, in the famous Kazanlik region of Bulgaria.

The price of the flowers fluctuates considerably from year to year. In 1986 the price of *R. damascena* flowers varied from Rs 1,000 to 1,200 per 40 kg. during the period from February to April (before February the flowers are not available) at Barwana and the neighbouring villages. During the same period the prices of 'Rose Edouard' oscillated between Rs 60 and 90 per 50 kg. (110 lb.). Rose cultivation in this region is, however, reported to be showing a

decline because the high-yielding varieties of cereals now available bring more income to the farmers!

Roses are also grown on a commercial scale in some other parts of India. For instance, they are cultivated near Amritsar for making conserve or *gulkand*, and, to a lesser extent, rose-water. In south India they are grown in the districts of Chinglepet, Thanjavur, Tiruchirapalli, Kumbhakonam and Madurai, mainly for devotional purposes and for personal decoration. 'Rose Edouard' is the variety used here. There are also rose-growing areas around Bangalore (Karnataka), Pune (Maharashtra) and Deogarh (Bihar).

The rose-oil is made in fire-heated country-stills by a process that requires 3–4 hours. In the steam-heated stills of copper, the time required is 2-2$^1/_2$ hours. The oils from the fire- and steam-heated stills differ in odour. But the yield of oil is very low. The former is less pungent and weaker in aroma than the latter, which possesses a stronger odour. In the directly fired stills the yield is slightly higher than in the steam-heated ones. Extraction of rose-oil by solvents is generally not practised in India.

However, recently the Central Institute of Medicinal and Aromatic Plants, Lucknow, has developed modern technology which is equivalent to the Bulgarian technology, and a semi-commercial plant has been installed in the Hasayan Block of Aligarh District by the Agra Vikas Mandal Nigam. The Nigam has been producing quality rose-oil for the last two years.

The Institute has also introduced the Bulgarian variety of *Rosa damascena* in Kashmir Valley, and a pilot plant based on modern technology for the extraction of essential oil has been installed. In Kashmir Valley the yield of flowers is 5–6 times that obtained in Uttar Pradesh and Bulgaria.

Other Rose Products in India

Gulkand: It is a conserve prepared by pounding together a mixture of rose petals and white sugar in equal proportions. Flowers of 'Rose Edouard' from which the sepals have been removed are mostly used. *Gulkand* is considered a tonic and a laxative.

Pankhuri: Dried rose petals, called *pankhuri*, are used during the hot weather for preparing cooling drinks. This sells at about Rs 675 per quintal (Rs 337 per hundred-weight).

Gul-roghan Hair-Oil: This is made by a modified maceration process in which rose flowers are spread over washed sesame (*til*) seeds in alternate layers, so that the perfume is absorbed by the latter. Each day, the exhausted flowers are removed and replaced by fresh ones, until the sesame seeds are saturated with the perfume. The seeds are thereafter crushed in a press or *ghani* to extract the perfumed oil.

Rose Products in Other Countries

In Europe, in the sixteenth and seventeenth centuries roses were treasured not only for their perfume but also for their supposed medicinal properties. They were used for many purposes including culinary uses, for perfumes, and for making pot-pourri, conserves and 'sweet bags'. Rose-water, rose-vinegar and also rose-petal wine were also in vogue. A fascinating account with details of some of the recipes is given in Julia Clements's delightful book entitled *My Roses*. Two recipes from this are reproduced below.

Rose-Petal Conserve*

The ingredients of the rose-petal conserve are red rose petals, sugar and orange-flower water.

Red roses make the best conserve and they must be gathered when fully open but before they begin to fade. Cut off the white heels, for these have a bitter flavour. Dry the petals on sieves out of direct sunlight and if possible in a draught as then they dry quickly. When dried, put a pound of petals into a muslin bag and plunge for a moment into boiling water. Drain well. Have ready a syrup made with a pound of loaf sugar and very little water. Add two tablespoonfuls of orange-flower water. Put in the petals and cook until the conserve is very thick. Keep on pressing the petals under the syrup. Pour into small jars and cover them securely.

This conserve has a most delicious flavour and the more richly scented the roses the better the flavour. 'Etoile de Hollande', 'General MacArthur' and other deep-red, scented roses are the best.

Pot-Pourri*

Spread the rose petals on newspaper and dry between layers of

* Reproduced from *My Roses* by Julia Clements, by the courtesy of the author.

common salt. The salt will absorb the moisture and bring out the perfume.

The petals can be kept in a box or jar until other ingredients are gathered as in season.

Certain leaves also make good additions, such as shredded bay leaves, mint, verbena, lavender and rosemary, sweet geranium, and sweet marjoram. Other flowers that can be dried and added are pink cloves, mock orange, lavender, in fact any sweet-scented flower, as long as it is not succulent and will dry out.

When all the ingredients are ready, mix all the petals well with powdered orris root (about $^1/_4$ lb.) and add about an ounce of ground cinnamon, cloves and nutmeg and some finely chopped pared rind of two lemons.

To make it extra good, add $^1/_2$ oz. of oil of bergamot, ditto geranium and ditto spirits of lavender.

Flowers can be added to this mixture through the season, but they must not be in the least bit damp, either from dew or rain; otherwise Mildew will set in. That is why you should always dry the flowers for the nucleus of the mixture, picking them on a dry day.

If the mixture becomes too dry, add more salt; if too moist, more orris root.

The mixture should not be allowed to dry out in the winter and added interest can be gained by mixing a few extra spots of essence.

Other Modern Uses

During the last world war the value of rose hips, which are produced in prodigious quantities by some of the wild and cultivated shrub roses and climbers, as a source of Vitamin C was again recognized in Great Britain. According to an authoritative bulletin by McCance and Widdowson, published in 1960, every 100 g. of rose-hip syrup contains 150 mg. of ascorbic acid (Vitamin C) compared with only 50 mg. present in raw orange juice, 20 mg. in raw tomatoes and 5 mg. in raw apples.

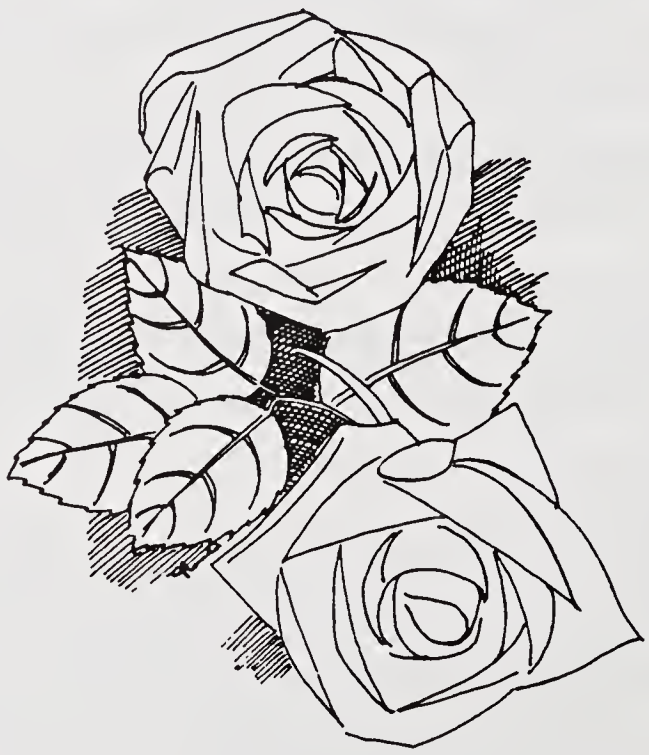
In Czechoslovakia a hot drink like tea and a popular wine are prepared from the fruits of wild roses, which grow in abundance there.

It is not possible here to list all the other uses of roses, but a very

interesting one in America has been the utilization of bushes of *Rosa multiflora* as a 'shock-absorber' or crash-barrier, for bringing to a stop motor vehicles when they run off the highway!

Adulteration and Adulterants

Because of the extremely high cost of rose-oil it is subjected to adulteration. L-citronellal or rhodinol from high-quality geranium oils, citronella extra, distilled costus root and refined guaic wood-oil are some of the adulterants used. These adulterants can be detected by specific gravity, rotation and congealing-point determinations. Some synthetics like rose oxide, phenyl ethyl alcohol and lina-lool are also used as adulterants.



CHAPTER 22

EXPORT OF ROSES

It is well known that there is a very large world trade in flowers, and the rose is at the number one spot in this. Therefore, for quite some time rose growers in India have raised the question as to why this large country with its great diversity of soils and climatic conditions could not have a share in this lucrative business, especially when countries like Israel in Asia, Egypt and Kenya in Africa and Colombia and Mexico in Latin America were doing so. In the previous editions of this book I had referred to the fact that a government undertaking, the State Trading Corporation, decided a few years ago to sponsor a project on the export of cut roses to the West European market, and the Indian Agricultural Research Institute, New Delhi, accordingly worked out a suitable technology for growing and handling quality blooms of the three rose varieties considered at that time to be popular in the European rose business and which also performed well under conditions in and near Delhi, namely 'Happiness', 'Queen Elizabeth' and 'Super Star'.

Small rose farms of five to ten acres each sprang up in the Chhatarpur area around the capital, and the State Trading Corporation made arrangements for collecting, conditioning and packaging the blooms which were sent by air to a few important centres in West Europe. The venture was at least partially successful and appeared to indicate that probably with the gaining of experience and more stringent planning there could be a future for rose exports. But somewhere along the line there was a loss of interest and the project was rather abruptly discontinued. Those who had set up rose farms began to send their blooms to Bombay, which was found to have a huge capacity for the absorption of cut roses. At that time the Delhi market for florist's quality roses was limited.

A very interesting and important happening that has taken

place recently has been the recognition of the Gulf region as an extremely important market for ornamental plants and cut flowers, including roses. This has led to the development of rose farming on a large scale in the western portion of the Deccan Plateau to meet the demand of both Bombay City and the Gulf countries, it is reported that rose farms of 200 acres or even more have come into existence. According to V.S. Padhye, many farmers around Pune (formerly Poona) and Nasik, the two main centres in Maharashtra for the cultivation of roses for the trade, have found it more profitable to convert their grape and sugarcane holdings into rose farms. It should be mentioned that both Pune and Nasik are within easy motorable distance from Bombay and its great airport.

Perhaps it should be stated here that both the Bombay and the Gulf markets are more accommodating for Indian rose growers in that unlike the European market they do not insist on very long stems and also accept the larger-flowered varieties which have been popular in this country.

To revert to the subject of possible export of cut roses to Europe, an officially sponsored team of experts was sent some time ago to a few European countries to study the markets there and assess the advisability of again trying to export roses from India. Some individuals have also on their own made critical estimates of the situation. The general impression appears to be that while there is some scope for entering the European market during the winter months when only the costly glass-house or poly-house roses are available in the market, it should be clearly understood that only the first-quality blooms will be acceptable. Such blooms cannot be produced in India unless some kind of protection is provided at flowering time, though this need not be in the shape of costly glass-houses or poly-houses. Some experimentation in this direction has been underway at the Indian Agricultural Research Institute at New Delhi and the Punjab Agricultural University at Ludhiana. It would also be desirable to initiate a well-planned breeding programme to create new varieties which will be floriferous over a long period with flowers which possess the desired qualities like beautiful shape, attractive colour, good keeping quality, etc., and which will not be easily damaged by the extremes of climate prevailing in the region.

No attempt has been made in this edition to set forth details of varieties, cultural practices, handling and packaging methodology, etc., because this will vary very greatly with the region. On present indications, the two possible areas for building up as basis for this export trade appear to be, the New Delhi region and the Pune-Nasik region. The New Delhi region has a favourable winter climate, which, however, extends to only about four months, and the Delhi airport makes this region easily accessible to the European flower-trade countries. The Pune-Nasik region has already started rose-growing on a large scale, and is close to Bombay.

Another region which from the viewpoint of soil and climate is extremely favourable is the Kashmir Valley, but here the flowering season is the same as in Europe, when field-grown roses are freely available at moderate prices, and its distance from even its nearest international airport, Delhi, is a handicap.

For those who are interested, a detailed exposition of the rose trade situation in the world, has been prepared at my request by Dr Vishnu Swarup, and this is given below.

EXPORT OF ROSE FLOWERS

In the days of the Pharoahs, Egypt shipped roses to Rome. The Greeks learned the uses of roses from the Egyptians. The Romans and the Greeks dedicated the rose to the Goddess of Love. Since then the rose is recognized as a symbol of love all over the world.

World Trade of Cut Flowers

The flower consumption in the world is about £ 8,750 million. There is an increasing import-export trade of cut flowers to meet the demand in various countries. The world import of cut flowers in 1983 was U.S. $1,221.11 million as compared to $543.21 million in 1975, which showed a growth of about 125 per cent. In 1983, the developed countries supplied about 7.9 per cent of the total imports while the developing countries had accounted for about 21 per cent. The Netherlands is the most important exporting country with a share of about 58.10 per cent, and among the developing countries Colombia contributes 14.73 per cent. There has been a steady in-

crease in the average consumption of cut flowers per caput in Western European countries which is about $20 to $22. In the Federal Republic of Germany the flower consumption has increased at the rate of 10 per cent per year during the last decade. Its total consumption of cut flowers in 1981 was around £1,500 million, about 17 per cent of the total consumption in the world. The highest consumption of cut flowers per caput is in Switzerland ($54) followed by the Netherlands ($44), Norway ($40), Federal Republic of Germany ($36), Italy ($18), Spain, Portugal, Greece ($10), and the United Kingdom ($6).

Import-Export of Rose Flowers

Among the various cut flowers popular in the import-export trade in the world, the rose occupies the first position followed by chrysanthemum and carnation which have second and third rank respectively. The European Economic Community, has estimated that about 5,000 million cut flowers of roses are sold each year in Europe. In 1981 the turnover of flower auctions in Holland exceeded 1,200 million cut rose blooms worth more than Df.400 million. The Netherlands is the largest producer and exporter of rose flowers. The Dutch-grown roses are exported to several European countries and mainly to the Federal Republic of Germany, which is the largest flower-consuming and flower-importing country in Europe, the rose contributing to about 20 per cent of the total imports of cut flowers. Italy, France, Israel and South Africa also export roses to West Germany.

In the total expenditure of cut flowers, roses contribute 40 per cent in France, 16 per cent in the Federal Republic of Germany, 15 per cent in the Netherlands, and 13 per cent (including both rose and carnation) in the United Kingdom. Although the production of rose flowers is substantially high in some of the important European countries like the Netherlands and the Federal Republic of Germany, these countries have to depend upon imports in order to meet the demand. The import of rose flowers in Europe is maximum during winter (November to March) and the prices during this period in most of the markets abroad are about 50 per cent higher than in other seasons.

Prices of Rose Blooms Abroad

The price of the rose in the market depends upon the season, variety, quality and country. In Holland the price of one rose bloom of the large-flowered variety is about 1 guilder on an average, and as high as 2.5–3 guilders during winter. A single flower of the variety 'Sonia' costs 60 cents to 2 guilders. The prices in summer range between 20 and 22 cents and as low as 9 cents for a flower with a stem length of 30 cm. In Israel, 'Sonia', and 'Mercedes' sell for 38 and 36 cents respectively in summer. In the Federal Republic of Germany a rose bloom with an 80-cm.-long stem fetches 1.80 to 2.5 DM in winter. In September the prices of blooms with 40-cm. stems are upwards of 0.80 Pfg, and those with 60-cm. stems are 0.35–0.40 Pfg. The prices of the rose in Denmark in May range from 1.35 Danish Kroner for cut roses with 40-cm. stems to 1.60 Danish Kroner for those with a stem length of 30 cm. Similarly in Sweden during summer the price is 2.50 Swedish Kroner for roses with 50-cm.-long stems and 1.75 Swedish Kroner for those with a stem length of 40 cm.

Export of Cut Flowers and Roses from India

Roses have the first place in the ranking of cut flowers not only in this country but also in foreign countries. The cut-flower trade in India is a recent development. A survey conducted in New Delhi in 1983 revealed that some of the top florists had a turnover of about Rs 3.5 million which was ten times that a decade ago. In view of the immense potential of exporting cut rose blooms from India to European countries during winter, the floriculture scientists of the Indian Agricultural Research Institute, New Delhi, in collaboration with the State Trading Corporation of India, made successful attempts to send roses conforming to international quality to the florists in Paris, Rotterdam and Frankfurt in 1969. Their efforts paved the way for export of roses and other cut flowers.

Since then sporadic attempts have been made by some growers to export rose flowers on a small scale. Recently roses are being exported from Pune to the Middle East countries, though in very limited quantities. The export of cut flowers from India was only Rs 0.588 million in 1981–82. Separate information on export of rose flowers is not available. Unfortunately there has not been much

headway in the export trade of roses during the last one and a half decades. However, the Government of India and its agencies like the Ministry of Commerce, the Processed Foods Export Promotion Council (now called the Agricultural Products Export Development Authority), the State Trading Corporation of India and the Trade Development Authority have given encouragement and support to floriculture export trade in recent years. A trade delegation of growers, trade and marketing organized by the Processed Foods Export Promotion Council (Ministry of Commerce) visited Moscow, Amsterdam, Hamburg and Frankfurt in 1981 to study the various aspects of production and marketing of cut flowers including roses and live plants for export. The team submitted a report along with recommendations to the Government of India. It has been reported that roses for export must be grown under cover in glass-houses or plastic-houses for obtaining blooms of the best quality required by foreign buyers. Rose flowers are in great demand in Europe during winter. It will be worth establishing an export trade of rose flowers from India. A few incentives have been provided to this new enterprise. Cut flowers are now included in the select list of products and exporters of cut flowers are given almost the same benefits as allowed to other exporters.

Rose Varieties for Export

Of the numerous varieties of roses, only a few are in demand for cut flowers in the markets abroad. Besides, old varieties are being replaced by newer ones within a decade or so of their release. For example, varieties like 'Baccara', 'Queen Elizabeth', 'Super Star' and a few others are now out of the market.

Both large and small roses are used for cut flowers. In flower auctions in Holland during 1981, 440 million blooms of the top ten large-flowered and 659 million of the top ten small-flowered roses were sold. Although the Floribundas are not popular presently, these have assumed some importance in the Netherlands recently, particularly for bouquets and floral arrangements. Among the large-flowered varieties, the most popular is 'Sonia Meilland' (salmon-pink) commonly known as 'Sonia'.

The next popular variety is 'Visa' (turkey-red) introduced by



100. 'Petite Folie' (Min.)
Flower vermilion, reverse carmine. Small double flowers in trusses. Easy to grow.



101. 'Cricri' (Min.)
One of the older Miniatures but still charming and easy to grow.



102. 'Green Ice' (Min.)
Flowers white to soft green. An easy-to-grow, easy-to-propagate Miniature. Equally delightful whether grown in pots or in the ground.

103. 'White Madonna' (Min.)
A very beautiful Miniature. The small double, white to pale-pink flowers are borne in clusters. Foliage glossy.





104. 'Candy Cane' (Cl. Min.)
Elegant and beautiful. With the slightest breeze the clusters of white, striped pink to light red, flowers dance a "light-winged elfin ballet in the air".

105. 'Magic Carrousel' (Min.)
This has proved to be one of the best Miniatures in India. Extremely beautiful.





106. 'Delhi Pink Pearl' (Rambler)

A natural sport from 'Echo', the well-known dwarf Polyantha, this vigorous rambler is covered in spring with sprays of flowers varying in colour from white to pink.



107. A climbing rose embellishes a dwelling at Simla in the Himalayas



108. 'Maréchal Niel' (Noisette)

One of the classic roses which was hailed as the finest yellow rose created when introduced in 1864. This climber, which was very popular in the last century and the earlier part of the present, bears well-formed double, richly scented golden-yellow blooms in great profusion.



109. 'Mermaid' (HBc)

A famous climber introduced in 1918, progeny of a cross between R. *bracteata* and a double yellow Tea rose. Flowers single, large 10-13 cm. (4-5 in.), creamy-yellow with conspicuous amber stamens. Better in the hills.



110. 'Piñata' (L. Cl.)

This semi-climber bred by Suzuki in Japan is perhaps the brightest pillar rose ever introduced. The flowers start clear yellow but are soon overlaid with orange and vermilion.



111. 'Cocktail' (Shrub)
This very bright geranium-red with yellow centre, suffused crimson, is usually classed among the climbers and ramblers in India though rated as a shrub in *Modern Roses*. Can also be grown as a hedge.

Meilland in 1972. The top ten large-flowered roses in the Netherlands in 1981 were 'Sonia' (salmon-pink, 225 million blooms), 'Ilona' (red, 80 million), 'Red Success' (red, 26 million), 'Baccara' (vermilion-red, 23 million), 'Laminuette' (white with light-red margin, 21 million), 'Aslsmeer Gold' (golden yellow, 19 million), 'Cocktail 80' (yellow, 15 million), 'Diana' (yellow, 14 million), 'Prive' (orange-red, 12 million), and 'Carlita' (pink, 5 million). The other common varieties are 'White Masterpiece' (white), 'Pasadena' (orange-red), 'Carombole' (deep orange), 'White Weekend' (greenish white), 'Sandokan' (bicolour with deep pink on edges), 'Bridal Pink' (light pink), 'Dr A.J. Verhage' (deep yellow), 'Lara' (light salmon), 'Bingo' (orange-red), 'Marina' (orange), 'Eva' (salmon-pink), 'Pink Sensation' (pink), 'Allegro' (deep orange), 'Aldra' (orange), 'Jofitali' (pink), 'Shocking Blue' (magenta), 'Veronica' (light pink), 'Athene' (lemon-yellow), 'Sterling Silver' (light mauve), and 'Manola' (pink).

Similarly the top ten small-flowered rose varieties in Holland in 1981 were 'Motrea' (red, 262 million blooms), 'Mercedes' (red, 124 million), 'Red Garnette' (red, 56 million), 'Belinda' (copper-gold-orange, 53 million), 'Carol' (deep rose-pink, 37 million), 'Jack-Frost' (lemon-yellow, 28 million), 'Carona' (red, 17 million), 'Golden Times' (deep yellow, 27 million), 'Evergold' (yellow, 24 million) and 'Jaguar' (red, 21 million).

There are many other small-flowered roses that are gaining popularity, like 'Coronet' (red), 'Candia' (bicolour, yellow and red), 'Gabrielle' (red), 'Gerdo' (salmon), 'Geza' (salmon-pink), 'Gold Belinda' (golden yellow), 'Sabrina' (golden yellow), 'Miss Ellen' (pink), 'Romeo' (orange-red), 'Junior Miss' (light pink), 'Rubinette' (red), 'Goldy' (deep yellow), 'Jelparaco' (light pink), 'Champagne' (apricot-yellow), 'Granada' (deep yellow), and 'Kristen' (orange). The Floribundas are becoming popular slowly. The important varieties are 'Doris Rijkers' (pink), 'Gloria Mundi' (orange), 'Pink Chiffon' (very light pink), 'Pink Delight' (light pink), and 'Jeldaniran' (pink).

Trade in Rose Flowers

In the European countries rose flowers are sold through three types of trade channels, namely florist trade, market trade, and street trade. The florist trade is a wholesale business in which additional

handling of flowers is not required. Large-flowered roses are generally distributed by the florist trade, and these are bought and sold singly in most cases.

However, in the Netherlands and the U.S.A., roses are sold in bunches of 10 and 12 blooms respectively. During summer, when the supply is high and prices low, even large-flowered roses are sold in bunches while the small-flowered are almost invariably sold in clusters. The large-flowered roses, being more expensive than the small-flowered ones, are bought by customers after careful planning. The buying of small-flowered roses is almost spontaneous. The buying habits vary in different countries. The Floribundas are now becoming popular because of their good keeping quality and their price, which is between the large-flowered and small-flowered roses. Their main disadvantage is that these are not available throughout the year. Their production and sale is maximum in summer. It may be worth exporting Floribunda roses to European countries during March–April, when Floribundas produce best blooms, and also during November–December from northern India. These can also be produced in Bangalore, Nasik and Pune in other seasons.

Production of Rose Flowers

As mentioned earlier the roses for export should be grown in glass-house, fibreglass-house, or plastic-house so that the production of flowers is dependable and their quality is maintained. For internal consumption as well as for short-distance markets abroad, like the Middle East, roses may be grown outdoors in open fields or under limited polythene cover on top of plants for obtaining blemish-free blooms. Experiments conducted at the Punjab Agricultural University, Ludhiana, and the Indian Agricultural Research Institute, New Delhi, have shown the usefulness of covering the bushes on top with polythene in producing clean and healthy flowers.

Rose plantations should be as near to an international airport as possible because the cut flowers will have to be rushed in the least possible time. Since freshness and the right stage of the buds are essential from the viewpoint of marketing-appeal, it is important that all operations are organized in such a way that the flowers reach the foreign market within 24 hours after removal from the fields. The

size of the rose plantation should be sufficiently large to ensure a constant supply of flowers during the export season. Foreign retailers of roses will not be interested in small consignments at odd intervals. Ordinarily to maintain an uninterrupted supply of flowers it is advisable to have at least two hectares of rose plants accommodating about 21,000 bushes at a distance of 60 cm. × 60 cm., so that a supply of about 1,500–2,000 blooms of exportable quality per day on an average can be maintained during the winter months from December to March. During this period about 180,000 to 240,000 blooms can be obtained for export. However, for continuity of blooms it will be necessary to prune the bushes three or four times at weekly intervals. Generally the flowers appear 45 days after pruning. It is desirable for the owner of this size of plantation to have the marketing of flowers done through an organization like the State Trading Corporation of India. Those who can afford, of course, may have larger plantations, and they may also prefer to handle both production and marketing on their own. But it should be remembered that it is essential to study the market and see what is the demand before rushing into this business.

Production in Greenhouses

The technology for production of rose flowers in greenhouse (glass-house or plastic-house) is almost unknown in India. In the Netherlands and some other countries the technique of glass-house production is highly advanced and mechanized with most operations being computer-controlled. The production of rose flowers under covered area is about ten times that in the open, besides being more dependable with blooms of better quality. In the Netherlands from an area of 12,000 square metres covered under glass-house, on an average 8,000 blooms are obtained per day or about 1.5 million flowers in a year. The cost of a glass-house of this size is approximately Rs 3.7 million. In the Netherlands the cost of the glass-house is about 70 Dutch guilders per square metre, including arrangements for heating. The distance of planting is very close, 35 cm. between rows and 25 cm. between plants. These closely planted bushes tend to grow tall without much branching and produce flowers on long stems.

Pre-cooling and Packaging

Rose flowers are cut while still in the bud stage after the sepals have curled back and the colour is fully showing. The flowers of small-flowered varieties and Floribundas, are cut when they begin to open in the cluster. The flower should be cut preferably in the evening, with long stems. The immature flower buds or those which are cut when the buds are too tight may fail to open, whereas those which have gone beyond the optimum stage may blow out on the way.

The cut blooms are immediately placed in plastic buckets full of water. Care should be taken to see that not too many stems are kept in one container so as to prevent the entangling of the foliage and tearing of the leaves by thorns. The stems should be completely immersed in water up to the neck and should be re-cut at an angle in water, about 2 cm. above the previous cut end. The blooms in buckets with water should then be stored at a cool air temperature of 5°C. for 6 to 12 hours to harden the buds and thus enhance their keeping quality. In case the flowers are to be kept longer, they should be put in water in cold storage at a temperature of 2° to 4°C. Pre-treatment with a chemical like 'Roseall' keeps the water clean longer, mainly by checking the growth of bacteria, which clog the vascular system.

For ease of grading at the time of packing, flowers that are uniform in colour, stem length and development should be grouped together at the time of cutting. In the foreign market the size of the stem varies from 60 to 90 cm. for large-flowered varieties and from 40 to 50 cm. for small-flowered varieties, depending upon the garden. The large-flowered bud is 3–3.5 cm. and the small-flowered one is 2–2.5 cm. In general, a variety to be commercially profitable should possess the following characteristics: A strong, free, clean growth without diseases like Powdery Mildew, Black Spot or Rust; long shapely, erect and pointed buds (the flower should not be too double); a texture firm enough to withstand shipping; strong stems; a pleasant colour which is not too variable; continuity of bloom; good keeping quality; and, if possible, fragrance. The colours which are preferred most are red, pink and orange. There is less demand for yellow and white roses. Bicoloured roses are not preferred in the market.

The flowers are finally graded according to the length of the stem and then packed in cardboard cartons made of 4-ply corrugated sheets with telescopic type of cover. They are bunched in round bundles and the stem portion is wrapped in wet newspaper sheets. To prevent the stems from breaking and the pack from loosening, at least two ties with rubber bands are made, one round the wrap below the flower heads and the other close to the base of the stems. For a greater sales-appeal, and also to avoid bruising of the flower buds, the whole bundle is wrapped in soft, white, butter-paper which should extend 5 cm. beyond the tips of the buds. The flower and some stem portion of the bundle should again be rolled up in a soft, corrugated cardboard sheet with the corrugated surface outside and the smooth surface inside so as to provide protection to the flowers against any pressure during packing or in transit. This should extend 5 cm. beyond the tips of the flower buds. Cardboard cartons 120 cm. long, 45 cm. wide and 25 cm. deep are used for packing of flowers. Four or five bundles (80 to 100 blooms) can be packed in a carton of this size. A thin sheet of polythene is spread at the bottom and sides of the carton, and very fine, moist, tissue-paper shavings are spread at each end of the carton to provide a cushion to the blooms. The flower bundles are placed in the carton length-wise, with the flower ends on the edges and an equal number of bundles facing both sides. Some space is left between the edges and the flower bundles so that the flowers are packed in two layers, a thick roll of fine tissue-paper shavings is placed between the two layers so that the flowers do not touch each other. Inside the carton, the bundles are kept intact by two wooden sticks at about 24 cm. from each end. The sticks are held in position by nails driven from both the outer sides of the carton wall across the breadth of the carton. A nylon-foam padding is provided underneath each stick to avoid any bruising of the bundles from the wooden sticks. A fine, white, tissue-paper sheet is spread over the top portion and then the carton is finally closed and fastened tightly with a thin but strong piece of string. The carton should naturally have a tastefully designed label.

Transport

Cooling is necessary during transport of flower packages. It is

advisable to have pre-cooled trucks for transportation of flower packages to the airport. The packages should be loaded in the aircraft with minimum delay in handling, plant quarantine inspection and customs clearance. The flight should be direct to the destination without any transhipment on the way. Since the flower sale or auction in the wholesale markets is in the early mornings, the flower consignments must reach there before that time.

Storage

Usually the wholesale trader does not open the packages and keeps them stacked in a cold room at a temperature lower than 10°C. However, when roses are to be kept longer, they should be put in water in a cold storage at a temperature of 2° to 4°C. Both the bucket and the water must be clean and the water should be pre-treated with an agent (chemical) to keep it clean for a longer period.

The retail trader unpacks the flowers immediately upon arrival and puts them in clean water after removing the leaves from the part of the stem which stands in water. Before putting the flowers in the water, about 2 cm. of the stem end is cut at an angle, preferably in the water. The buckets containing flowers in the water are kept in cold storage. Generally cut-flower food is added to the water in which the flowers are stored. The cut-flower food contains bactericidal and fungicidal substances which keep the water clean longer, improve the keeping quality, avoid wilting of stems and promote opening of flowers. In the flower vase in the home it is advisable to use cut-flower food, clean water and vase. The stem should be cut at an angle about 2 cm. above the earlier cut end. The leaves likely to be in water should be removed.

CHAPTER 23

INDIAN ROSE VARIETIES

BREEDING of rose varieties made a late start in India and the earliest mention I have been able to find about an Indian-raised variety relates to the one named 'Dr S.D. Mukherjee', introduced by B.K. Roy Choudhury in 1935. But the first phase of rose breeding in this country was dominated by B.S. Bhatcharji, head of the well-known rose nursery at Deogarh on the border of Bengal and Bihar, who with his two sons raised a very large number of varieties between 1941, when the first one, 'Ramakrishnadeva', was introduced, and 1968. The avowed objective of the work was to raise new varieties for the tropics, and some of the originations from Deogarh were popular in the eastern part of the north Indian plain; a few of the more outstanding Hybrid Teas like 'Heart Throb' (large, shapely rich red and fragrant), 'Raja Ram Mohon Roy' (bronzy apricot) and the Floribunda 'Pandit Nehru' (orange-scarlet) are still grown in some places in India. Lamentably, however, the parentage of the varieties was not disclosed, nor is there a record of the breeding procedures employed. Such information could have been of great value to later rose breeders. Such details are also not available for the varieties bred by other early breeders B.K. Roy Choudhury and A.K. Roy Choudhury. There was yet another rose breeder, S.P. Banerjee, who apparently raised some varieties in the fifties and sixties and named them, but it is not known whether or when he released them.

Before the stream of varieties from the B.S. Bhatcharji nursery ceased, there was a new upsurge of rose breeding in which nurserymen, research institutes and amateurs participated— remarkable because it was not stimulated by some sudden event like the introduction of a system of patenting new roses. In fact, plants still cannot be patented in this country. The famous plant nursery KSG Son, of Bangalore, made a strong entry into the field of rose breeding when

its present head, G. Kasturi Rangan, decided to work on roses. Among the very large number of his creations, mention may be made of the Hybrid Teas 'Srinivasa' (red-and-white bicolour) and 'City of Panjim' (luminous pink and off-white bicolour). There have also been many Floribundas and Polyanthas, among the latter being the remarkable magenta-purple Polyantha, 'Bharani'; the Miniatures include the truly exquisite 'Chandrika' with its clusters of greenish-white to pure-white buds and flowers.

Among other nurseries which have also entered the arena of rose breeding, mention may be made of Anand Roses at Jaipur, where Mrs P.L. Airun had success with her very first seedling, 'Golden Rays', selected from a cross between 'Whisky Mac' × 'Duet', and Friends Rosery at Lucknow, where J.P. Agarwal introduced a beautiful rose named 'Kasturi Rangan' in the lilac-lavender group. Laveena Roses at Meerut have released several new seedling roses of their own, and at Doon Valley Roses at Dehra Dun in the Himalayan foothills, Arpi Thakur bred the Hybrid Tea 'Ajanta' (mauve with greenish shading at the base of the petals). R.R. Karnad and his associates at the TISCO Nursery at Jamshedpur in Bihar have likewise been active. I, however, do not propose to give an exhaustive list of rose breeders because I do not have the information necessary for such an attempt.

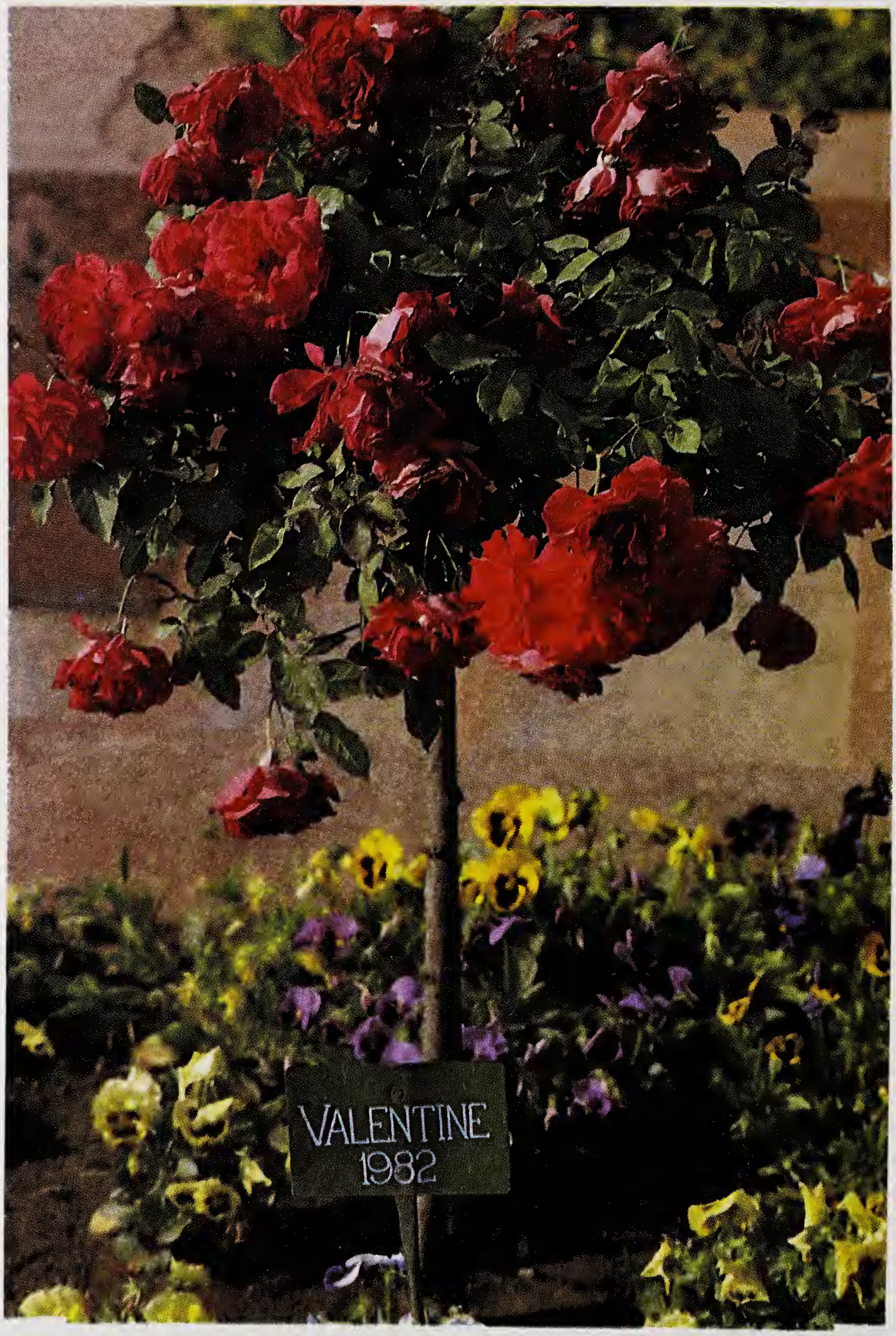
In some countries, for instance, Canada and the United States, some research laboratories of the Agriculture Departments have for a number of years been working on some long-range problems, such as the evolution of varieties resistant to extreme winter cold, or to some of the serious diseases like Mildew or Black Spot that plague roses. The entry of some research institutes in this country, too, should help in the finding of solutions to the pressing problems standing in the way of greater expansion of rose growing.

The internationally known Indian Agricultural Research Institute (founded in 1905 with the name Imperial Agricultural Research Institute) has been breeding garden roses since the sixties; besides employing the ordinary breeding procedures it has also conducted mutation breeding. It is now one of the major rose breeding centres in India. Amongst its successes in this field in the Hybrid Teas is the beautiful pink 'Mrinalini', the attractive white 'Jawahar' and the



112. 'Akito' (Fl.)

Medium-sized flowers of perfect H.T. shape are produced in great numbers by a very vigorous bushy plant. An outstanding white Floribunda. The photograph above shows it grown as a Standard.



113. 'Valentine' (Fl.)

Bright-red, semi-double flowers in huge clusters. The photograph shows the plant grown as a Half-Standard in the famous Mogul Gardens of the Rashtrapati Bhavan in New Delhi.



114. 'Iceberg' ('Schneewittchen') (Fl.)
This famous Floribunda from Kordes of German is a favourite in many parts of the world. The picture above depicts a Half-Standard in the Mogul Gardens, New Delhi.



115. The National Rose Garden, New Delhi

Established by the Rose Society of India in Chanakyapuri (Diplomatic Enclave), the photograph above was taken at an early stage of the garden's development. It is open to the public and is thronged by rose-lovers throughout the season.

exquisite 'Abhisarika', the last-named being a product of the mutation breeding programme. The most recent introduction from the Institute, the pink-and-white 'Priyadarshini', has attracted much notice. However, the greatest impact of the Institute so far has been in the Floribundas, where the list of successes includes pink-and-white 'Prema', the deep lavender-lilac 'Neelambari', the white or near-white 'Shabnam', besides 'Suryodaya', 'Shringar' and 'Sindoor' in the orange-scarlet group, and the fabulous 'Mohini', whose flowers are deep brown in cold weather. One should also point out 'Sadabahar', its striped mutant, 'Nav Sadabahar', and 'Arunima', which bloom in a riotous profusion. The Institute now has on its programme long-range objectives like breeding roses specially adapted to tropical conditions, and for incorporating disease resistance into popular garden varieties.

The Indian Institute of Horticultural Research located near Bangalore in a completely different climatic zone, like the Indian Agricultural Research Institute, has a separate division dealing with ornamental crops, rose breeding being part of its research activity. Mutation studies using garden roses have been in progress not only at the two institutes just mentioned but also at the National Botanical Research Institute at Lucknow, at the Bhabha Atomic Research Centre at Trombay, and possibly at a few universities.

Coming now to the category of amateur rose breeders—and I count myself among them—there emerged a large number of persons who had been smitten by the urge to create new varieties; they varied from individuals who laid no claim to scientific education, to others who possessed post-graduate degrees in the disciplines of genetics and plant breeding. Some of them carefully selected the donor parents for the objectives they had in mind, made crosses between them, and, finally, practised selection from the consequent segregating populations of seedlings. There were a few who did no more than to introduce natural sports (somatic mutations) they had managed to 'spot'. Persons in the last category cannot, strictly speaking, be called breeders though the identification of natural sports can sometimes lead to useful results.

To strike a personal note, I was one of the very first amateurs to take up rose breeding as a hobby. My main work in the field of

agricultural science was the breeding of disease-resistant strains of one of India's most important crops, wheat (though I worked on a few other crop plants also), but I reached a stage when, on being appointed to a senior post involving heavy administrative duties, I had to give up crop breeding and looked for a hobby where I could combine my love of plants and flowers with my experience in genetical crop improvement but which could be conducted at a level where it would not be too demanding. I found rose breeding so fascinating that my erstwhile principal hobby, namely, 'Sunday painting', began to take second place! Keeping in mind the constraints of time and resources, I did not plan an ambitious or long-range programme on roses.

I started with open-pollinated seeds of the well-known 'Gruss an Teplitz', bred by Geschwind and introduced by Lambert in 1897, with its very fragrant crimson flowers which grow very well in many parts of India. But soon I went on to hybridization though I did not abandon the use of open-pollinated seed; the complex ancestry of many roses and the activities of honey-bees ensured a tremendous range of genetic variability in the seedlings raised therefrom. I have continued rose breeding long after retirement from service, thanks to the facilities generously provided by the Indian Agricultural Research Institute, for which I am most grateful, and made available to nurserymen who wished to have a very large number of varieties. To mention a very few, there was among Hybrid Teas 'Dr Homi Bhabha', named after the renowned atomic scientist who died in an air crash on Mont Blanc, of classical form and a purer white than most others; 'Poornima' with its very long light-yellow buds (the open flower however is a rich butter-yellow) and Tea-type fragrance; 'Raja of Nalagarh', large, well-formed, orange-salmon on long upright stems; 'Kanakangi' with a most attractive orange-apricot colouring and delightful fragrance, but a garden and not an exhibition rose; the very dark, velvety blackish-red 'Mechak', where every bloom seems to come perfect. Among the most recent ones, I would refer only to 'Rajhans' or 'Royal Swan' (white) with beautifully shaped, very double flowers (I have not come across any white rose which has a stronger sweet fragrance), the porcelain-pink 'Apsara', and the striking orange-red 'Jawani'.

Among my Floribundas, I would specially mention 'Delhi Princess' with large sparkling pink flowers, produced singly or in clusters in amazing abundance, and which repeats very quickly, and 'Banjaran' with its gold and flame-red colouring which has been extremely popular. On the initiative of a rosarian of Delhi a few years ago, two plants of 'Banjaran' were sent for a two-year trial to a rose expert in Virginia in the United States, who it is understood was an assessor for one of the leading rose nurseries in that country. A glowing report was received at the end of the trial, and the gentleman who conducted the trial mentioned that he sent flowering sprays of 'Banjaran' to the two major Rose Shows in his area. In one it received a first prize as the best Floribunda in the Show, and in the second Show it received a second prize. Belonging to the earlier period, I would also like to mention the soft-pink 'Loree' with enormous clusters of blooms, and 'Kumkum', a very bright orange-scarlet. In the recent past, I have released more of the Hybrid Tea-type Floribundas—among them, 'Madhura', with large light-yellow and pink blooms, the brilliantly coloured orange-scarlet to orange-salmon 'Surya Kiran', and the deep-pink-edged-white 'Saroja', looking very much like a Floribunda edition of 'Rose Gaujard'.

Among the unforgettable names in modern rose history in India is that of Raja Surendra Singh of Nalagarh, a member of the Princely Order which dissolved soon after India became independent. The handsome, dynamic Raja, who later became the President of the Rose Society of India, took to 'growing, knowing, showing and breeding roses' — to slightly modify the title of A.S. Thomas's fine book—with rare dedication and fervour. He bred thirteen varieties in a short span of time before sudden, untimely death removed him. His two best-known creations were the satin-pink 'Nazr-e-nazr' and the lilac-mauve 'Yamini Krishnamoorthy', the latter named after one of the country's premier danseuses.

About the same time as Raja Surendra Singh, M.N. Hardikar and M.S. Viraraghavan entered the rose breeding arena. Hardikar, working in western India, has paid particular attention to his aim of producing a really good crimson rose, though he has not neglected other colours and blends. M.S. Viraraghavan came on the rose improvement scene like a breath of fresh air. Whereas most other

breeders whether working in nurseries, institutes or on their own, have tended to adopt what I call the safer 'bird-in-the-hand' policy as regards the selection of parent varieties for their crosses and the objectives they set themselves, Viraraghavan appears to have agreed with Bret Harte, who wrote:

A bird in the hand is a certainty. But a bird in the bush may sing!

Viraraghavan has stated that when he started rose breeding in 1966 one of his main objectives was 'evolving a long-lasting petal texture to cope with the scorching Indian sun'. His account of his experiments using some of the older types like the Polyantha 'Cécile Brunner' and the fragrant Bourbon hybrid 'Rose Edouard' is most interesting. Very recently he has initiated what he calls 'first steps' in hybridization with *Rosa clinophylla*, the wild rose that descends to the plains of Bengal and is also found in some other tropical areas of the country. But space constraints do not permit me to go into details. Another of his objectives has been the evolution of a good Hybrid Tea in the 'hand-painted' range, where he has had some success. Among the Hybrid Tea varieties raised by him may be mentioned 'Kanchi' (velvety magenta-purple), 'Vanamali' (orchid-lavender), 'Nefertiti' (golden amber) and the 'hand-painted' 'Priyatama', 'Priyamvada' and 'Abhaya '87'. Among his Floribundas are the vivid orange-red 'Mahadev', and the Anthurium-red-and-white bicolour, 'Bhagmati', which displays heat resistance and good petal texture.

The seventies saw the rise of two more rose breeders who have achieved success, Y.K. Hande and Braham Dutt. The former has to his credit striking roses combining colour and lovely form like 'Ajanta Caves', ' Indian Pearl' and 'Lokmanya', while Braham Dutt has raised 'K.K. Thakur' (apricot), 'Don Nielson' (pink) and 'Pride of Nagpur' (dusky red). Like some of the breeders mentioned earlier, they have many more roses to their credit. I have mentioned only a very few names, almost at random. There are also a few other breeders, who have come into the limelight but I do not have sufficient authentic information to be able to write about them. In the list of varieties which is presented at the end of this chapter, an attempt has been made to give the names of the breeders, the varieties they have to their credit and very terse descriptions of

these. The list may not be complete, and I hope to be forgiven if I have left out any.

The influx, if one may use that word, of new breeders has continued into the eighties and the number of breeders and the number of Indian-raised varieties is impressive. Hence the question may pertinently be asked: Why do we not see more Indian roses in private and public gardens and at most of the Rose Shows? There are several reasons, but I shall refer below to only two which I consider to be the most important.

First, as is beginning now to be appreciated, there are really no 'universal' varieties, that is, those which will do well everywhere, though of course there are a few like 'Queen Elizabeth' and 'Iceberg' whose genetic make-up gives them the capacity to flourish under a wider range of conditions than some others. As India is a sub-continent with a number of soil-climatic regions or zones which differ widely from each other there has been no attempt to systematically compile data on the performance of rose varieties in these zones and to offer advice to the rose growers as to which Indian varieties are best adapted to the area they reside in. Such service is available in the United States, where well-defined zones have been demarcated on the basis of frost incidence, which is such a dominant factor in that country besides other relevant factors.

Second, we are up against a vicious circle—the would-be grower of Indian varieties does not know which varieties he should ask for since he has had no opportunity to see them, and the nurseryman does not multiply and offer them for sale 'because there is no demand'. After all, the nurseryman multiplies rose varieties to sell them and make money: he finds it easier to retail those that come from abroad — he can even charge a higher price for them — as they come accompanied by beautiful colour photos and descriptions which someone has described as 'commercial lyrics'. One such that sticks in my memory was used in the catalogue of a leading American Nursery in the early seventies when introducing the first of McGredy's so-called 'hand-painted' series of roses named after the great Spanish master, Picasso. Below the colour photo of the now-famous rose were the words:

'The hand-painted masterpiece, tranquil new beauty from

Northern Ireland, 'Picasso' displays the timeless quality of an impressionist canvas. Contemplate it for a moment and you may hear strains from Mussorgsky's "Pictures at an Exhibition". The salmon buds touched with flame, open to these unique blooms, white-centred, each pink-tipped petal boldly brushed with varying bands of brilliant scarlet.'

The eminent rose authority from Australia A.S. Thomas has made the following statement in the fifth edition of his well-known book, *Better Roses*: 'Hundreds of oversea cultivars come to us with descriptions that should lead us to burn all their predecessors and fill our gardens with the new ones. We try many of them in the first year and quickly find their worthlessness. Very few people buy Australian novelties until someone has grown them for several years and either exhibited them successfully or spoken highly of their value...many very good Australian roses have been passed over, simply because the public has never seen or heard of them'. How well Dr Thomas's words fit the situation in India!

Dr Thomas has further stated that while very few of the Australian roses are of the exhibition type, most of them are strong, disease-resistant and continuously in bloom, making them ideal for garden display and home decoration. He says they are not 'classical blooms, but they provide a constant joy'. In India, most people form their impressions about the merits of varieties from what they see at a Rose Show. Those who compete—sometimes known as 'pot-hunters' or 'hardware collectors' — grow only a limited number of varieties which they feel are likely to provide them with exhibition-quality flowers on Show Day. They are generally not interested in qualities like the ability to repeat quickly so that flushes of blooms follow each other rapidly, making available large quantities of flowers; scent, again is not of much consequence to the avid exhibitor because for the major trophies fragrance is not generally given weightage. Visitors to a Rose Show may go away with wrong impressions of the merits of varieties because there are hardly any classes or sections for decorative roses. We may ask: What percentage of rose growers exhibit their blooms in Shows? The answer is: Very very small. Indian varieties, by and large, have been quite rightly bred for their garden and home-decoration qualities.

Rose Societies could perform a real service to rose-lovers by emphasizing that one of the great assets of the Queen of the Flowers is the tremendous variety of types available and that, for most people, the varieties that contribute to charm of the garden, which are floriferous, healthy and easy to grow, are more useful than the so-called exhibition types. In reviews of Rose Shows while a lot of coverage is given to the blooms that were awarded titles like King of the Show and Queen of the Show, often nothing, unfortunately, is said about other very beautiful roses that were also displayed.

The best display of Indian-raised varieties is to be seen at the Winter Rose Show, held in mid-December, and the Spring Rose Show, held at the end of March, in New Delhi by the Rose Society of India. Because the Indian Agricultural Research Institute, one of the major rose breeding centres of the country, is located in New Delhi, one can count on a truly magnificent display of correctly named Indian rose varieties. The National Rose Garden established by the Rose Society of India in Chanakyapuri (Diplomatic Enclave) has numerous beds where Indian varieties can be seen growing side by side with foreign varieties.

I am inclined to believe that Indian-bred rose varieties will have a good future if some of our leading nurseries begin to full-heartedly sponsor the best of these. Perhaps this will happen if and when patenting of roses is permitted in India, because only then will nurserymen feel that it is really worth their while to do so.

In the table that follows, I have given a summary of the new varieties which have been raised in India after the publication of the last edition of my book. This is based on the information generously and promptly supplied to me by the more important breeders; where direct contact with the breeders was not possible, I have depended on printed rose catalogues of nurseries of repute. There have been a very few cases where a new variety was raised and introduced but during the period I am dealing with has become extinct: such cases have been omitted. The list therefore comprises varieties which have been raised in India and released, and which are, as far as known, still available. The descriptions have been kept very terse, concentrating mainly on a few attributes of the flowers.

Although the number of Indian-raised varieties is quite large,

many of them for some reason or other have not been registered with the International Rose Registration Authority, with the result that their descriptions are not included in *Modern Roses 8* and *Modern Roses 9*.

Name	Class	Year of introduction	Brief description
Agarwal, J.P.			
'Asha'	H.T.	1968	Salmon-yellow and pink blend; large, high-centred; very fragrant. Sport of 'Wendy Cussons'.
'Bharti'	H.T.	1984	Blush pink; very large blooms. A sport.
'Kasturi Rangan'	H.T.	1983	Mauve with yellow base; well-formed, high-centred, fragrant blooms. Sport of 'Madhosh'.
'Manu Mukerji'	H.T.	1974	Deep-yellow sport of 'Fragrant Cloud'.
'Protima'	H.T.	1975	Orange-pink; large, high-centred, sport of 'Elida'.
'Rose Bansal'	H.T.	1974	Yellow and copper blend; sport of 'Anvil Sparks'.
'Shanti'	H.T.	1980	Deep yellow, splashed saffron on edges; sport of 'Peace'.
Airun, P.L.			
'Golden Rays'	Floribunda	1976	Golden yellow; well-shaped H.T.-type blooms singly or in small clusters; free-flowering.
'Mahak'	Floribunda	1982	Large peach-pink-apricot blooms finally change to golden coral-apricot, very fragrant.
Bansal, O.P.			
'Climbing Rumba'	Climber	1972	A climbing form of the well-known 'Rumba'; very free-blooming.

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Name	Class	Year of introduction	Brief description
'Sobhag'	Floribunda	1971	Dazzling orange with tinge of scarlet on ageing; medium-sized clusters.
Braham Dutt			
'Don Nielson'	Floribunda	1983	Pink and cream bicolour; well-shaped, large, fragrant flowers.
'Gond Beauty'	H.T.	1983	Bicoloured, bright red with silvery-white reverse.
'K.K. Thakur'	H.T.	1980	Two-toned apricot; well-formed, large flowers; free-flowering.
'Pride of Nagpur'	H.T.	1983	Dark red; large buds and flowers; fragrant.
'Soft Touch'	H.T.	1983	Vermilion; shapely blooms.
Chiplunkar, C.R.			
'Climbing Matangi'	Climber	1985	Climbing sport of the well-known 'hand-painted' Floribunda 'Matangi', very free-flowering.
'Deccan Delight'	Floribunda	1985	Orange and white blend; huge trusses; sport of 'First Edition'.
Dey, S.C.			
'Christian Era'	H.T.	1983	Phlox-pink; shapely long-lasting flowers; fragrant.
'Climbing Etoile de France'	Climber	—	Red; fragrant; climbing sport of the well-known old variety.
'Martin Luther King'	H.T.	1981	Deep-blackish crimson; shapely flowers; strong fragrance.
'Orange Star'	H.T.	1986	Flowers orange; large, well formed.
'Red Vatertag'	Polyantha	1983	Dark-red mutant of 'Vatertag'.

Name	Class	Year of introduction	Brief description
'Sun God'	H.T.	1978	Apricot with buff-yellow shading; large, double.
Dhar, P.N.			
'Baljeet'	H.T.	1979	Red; large, double flowers; free-blooming.
Gatne, Sharad			
'PuRoSo-25'	H.T.	1987	Pink; well-formed, double, lasting flowers; free-flowering.
Gayatri and Lakshmi Narayan			
'Agni'	H.T.	1985	Deep orange and red with blackish sheen; high-centred, long-lasting blooms.
'Black Delight'	H.T.	1985	Blackish red; shapely well-formed, medium-sized flowers; free-blooming.
'Kaina'	H.T.	1985	White edged pink, with white reverse; shapely, well-formed blooms.
Govindachari, T.R.			
'Rajamani'	Floribunda	1972	Light yellow, deep yellow at centre; full, double, medium-sized flowers; scented.
Gupta, K.D.			
'Durgapur Delight'	H.T.	1980	Light-porcelain-pink sport of 'Montezuma'.
Gupta, M.N.			
'Angara'	H.T.	1977	Light-red sport of 'Montezuma'.
Hande, Y.K.			
'Ajanta Caves'	H.T.	1983	Ivory-white with scarlet-red

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Name	Class	Year of introduction	Brief description
			edges and reverse, high-centred; well-formed flowers.
'Blue Ocean'	H.T.	1983	Light mauve blend; urn-shaped buds; very large double flowers.
'Ellora Caves'	H.T.	1986	Light pink, exhibition form, tall.
'Gauri'	H.T.	1985	Dusky red; long-lasting, well-shaped medium-sized flowers.
'Good Morning'	H.T.	1983	Creamy apricot blended pink.
'Indian Pearl'	H.T.	1983	Luminous pearly pink; ovoid buds, large, double, lasting-flowers on stiff stems, stands hot weather.
'Insat'	H.T.	1985	Sport of 'Gauri', white splashes and dots on deep pink.
'Jotiba'	H.T.	1986	Snow-white, well-shaped, double, fragrant flowers.
'Lokmanya'	H.T.	1987	Light coppery orange with deeper reverse, very large, shapely.
'Perfumer'	H.T.	1983	Deep pink; large fully double, flowers; strong tea scent.
'Pink Wave'	H.T.	1985	Light pink; shapely, double flowers; wavy petals.
'Vivekanand'	H.T.	1986	Deep-crimson, velvety, well-formed, lasting flowers; tall.
Hardikar, M.N.			
'Bright Garbs'	Floribunda	1977	Orange blend, profuse, continuous flowering; dwarf.
'Cynosure'	H.T.	1973	Red with pink stripes; large, double, open flowers; highly scented.
'Enemy of War'	H.T.	1986	Pink blend, bud ovoid; double, open blooms.

Name	Class	Year of introduction	Brief description
'First Rose Convention'	H.T.	1978	Dark red; large, double flowers.
'Flying Tata'	H.T.	1982	Dark-red, well-formed, high-centred, long-lasting scented flowers.
'Friend of Heart'	H.T.	1985	Pink blend; large, high-centred blooms.
'Friend of Peace'	H.T.	1986	Yellow blend, long buds and globular blooms.
'Gulab-e-Pal'	H.T.	1985	Mauve blend; long, pointed buds; large, double.
'Sadaranga'	H.T.	1977	Flowers pink; large, globular.
'Shree Dayanand'	H.T.	1979	Pink blend; full, double flowers.
'Sunil Gavaskar'	Floribunda	1985	Mauve; globular buds; double; open flowers.
'Swami'	H.T.	1973	Light pink; large, high-centred.
Kaicker, U.S. and Swarup, V.			
'Abhisarika'	H.T.	1977	Striped mutant of 'Kiss of Fire'. Pink and purplish streaks on apricot and pink.
'Madhosh'	H.T.	1975	Mutant of 'Gulzar'. Deep magenta-red with mauve, broad streaks.
'Pusa Christina'	H.T.	1975	Pink sport of 'Christian Dior' with yellow base of petals.
Malik, R.S. and Singh, A.P.			
'Anurag'	H.T.	1980	Tyrian rose; shapely; high-centred blooms; fragrant.
'Arjun'	H.T.	1980	Porcelain-rose; large, shapely blooms; very long, uniformly thick shoots; very tall.
'Chandrama'	Floribunda	1980	White; pink buds; lasting, small to big clusters.

Name	Class	Year of introduction	Brief description
'Dr B.P. Pal'	H.T.	1980	Pink; large, shapely, high-centred, long-lasting flowers; profuse blooming.
'Jawahar'	H.T.	1980	Creamy white; large, high-centred, shapely blooms; glossy foliage.
'Nav Sadabahar'	Floribunda	1980	Bud sport of 'Sadabahar'. White streaks on pink.
'Nur Jehan'	H.T.	1980	Pink; very large, high-centred, shapely blooms, highly scented.
'Pink Montezuma'	H.T.	1980	Spinel-pink; sport of 'Montezuma'.
'Sindoor'	Floribunda	1980	Geranium-lake; well-formed, H.T.-type flowers in singles and clusters.
'Soma'	H.T.	1980	Pink; large, well-formed, double flowers.
'Vasant'	H.T.	1980	Yellow blend; shapely, medium flowers; profuse, continuous blooming.
Malik, R.S., Singh, A.P. and Dadlani, N.K.			
'Priyadarshini'	H.T.	1986	Shapely flowers of rhodamine-pink, deeper pink towards the edges of petals; profuse blooming.
Swarup, V., Malik, R.S. and Singh, A.P.			
'Arunima'	Floribunda	1975	Deep pink; very long-lasting, big bunches; compact.
'Charugandha'	H.T.	1972	Crimson-red; very large, double, shapely flowers; highly scented.
'Chitralekha'	H.T.	1972	Ruby-red to smoky; large, shapely, flowers.
'Deepika'	Floribunda	1975	Mandarin-red with lighter reverse and yellow base; pointed, small buds; attractive colour; small bunches.

Name	Class	Year of introduction	Brief description
'Deepshikha'	Floribunda	1975	Dutch-vermilion; double and open flowers; big clusters.
'Kavita'	Floribunda	1972	Orient-pink; big bunches; profuse blooming; vigorous.
'Mridula'	H.T.	1975	Creamy-white to pinkish-white buds; large, shapely flowers; fragrant; vigorous.
'Mrinalini'	H.T.	1972	Phlox-pink; very large, high-centred, long-lasting blooms.
'Neelambari'	Floribunda	1975	Magenta-rose; H.T.-type blooms in singles and big bunches.
'Rajkumari'	H.T.	1975	Deep-pink, large, well-formed, very double flowers.
'Raktagandha'	H.T.	1975	Shining red; large high-centred flowers; uniformly thick stem.
'Shabnam'	Floribunda	1975	White; very big clusters; upright; vigorous.
'Shringar'	Floribunda	1972	Pink blend; semi-double. Very long-lasting flowers; big clusters.
'Suchitra'	Floribunda	1972	Pink with white reverse; well-formed, H.T.-type blooms; big bunches.
'Surabhi'	H.T.	1975	Phlox-pink; long, tapering buds; large, shapely blooms; very fragrant.
'Usha'	Floribunda	1975	Deep camellia-rose; lighter reverse; small, long-lasting flowers.
Jagtap, Rama Rao S.			
'Chandralekha'	H.T.	—	A sport of 'Siddhartha'. Deep coral-pink, shaded salmon; shapely blooms.

Name	Class	Year of introduction	Brief description
Jolly, Sunil			
'Kanak'	Floribunda	1985	A yellow sport of 'Charisma'.
Laveena Roses			
'Chunmun'	Miniature	1983	Salmon-shaded coral; small blooms in great profusion.
'Maharaj'	Shrub Rose	1974	Rose-pink, large, double flowers; tall and spreading.
'Prabha'	H.T.	1983	Deep magenta-mauve; well-formed, shapely blooms; fragrant.
'Climbing Landora'	Climber	—	Sport of 'Landora', which is registered in *Modern Roses 8* as 'Sunblest'.
Padhye, V.S.			
'Kusum'	Floribunda	1978	Pale pink; long-lasting and loaded with flowers. A sport of 'Fusilier'.
Pal, B.P.			
'Akash Nartaki'	Floribunda	1983	Silvery lilac; semi-double to double; petals wavy and frilled; fragrant.
'Akash Sundari'	H.T.	1982	Two-toned lilac-pink; very large, shapely blooms.
'Apsara'	H.T.	1982	Luminous porcelain-pink; medium, double, long-lasting flowers; on long, upright stems; fragrant.
'Ashirwad'	H.T.	1984	Red; large, double. Floriferous.
'Chambe di Kali'	H.T.	1983	Pink; large, high-centred, shapely blooms; shining leaves.
'Chingari'	Floribunda	1976	Yellow and red blend; profuse flowering.
'Chitchor'	Floribunda	1972	White suffused with pink; big clusters; profuse blooming.

Name	Class	Year of introduction	Brief description
'Climbing Dr Homi Bhabha'	Climber	1975	Climbing bud sport of 'Dr Homi Bhabha'.
'Deepak'	Floribunda	1977	Orange and flame-red; small flowers like those of a Miniature in big bunches.
'Dil ki Rani'	H.T.	1985	Luminous pink; long buds; large, high-centred, shapely blooms.
'Dilruba'	H.T.	1984	Blackish crimson, velvety; high-centred, large blooms; highly fragrant.
'Diva Swapna'	H.T.	1981	Pink and white; shapely with reflexing petals; strong fragrance.
'Dr R.R. Pal'	H.T.	1983	Very dark-red blend; large, double flowers.
'Dulhan'	H.T.	1983	Light red; conical buds; shapely, large, fully double; fragrant.
'Eastern Princess'	H.T.	1984	Orange-coral with gold base; high-centred, with reflexing petals; strong fragrance.
'Golden Afternoon'	H.T.	1984	Golden apricot-orange, deeper reverse; delicious spicy fragrance; glossy leaves.
'Gulbadan'	H.T.	1976	White flushed with pink; large, shapely blooms; fragrant.
'Haseena'	H.T.	1979	Soft pink; shapely, long-lasting blooms; fragrant.
'Homage'	H.T.	1986	Pink blend; high-centred, shapely, double, long-lasting flowers; free-flowering; vigorous.
'Indian Princess'	H.T.	1980	Light red and carmine; shapely buds and large double flowers; scented; vigorous.
'Jantar Mantar'	Floribunda	1980	Crimson-red; long-lasting, H.T-type blooms; many clusters of 4-6 blooms on long stems, very vigorous.

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Name	Class	Year of introduction	Brief description
'Jawani'	H.T.	1985	Bright orange-red; large, double, long-lasting flowers; floriferous; tall; vigorous.
'Kulu Belle'	H.T.	1972	Pink; long, tapering buds; large; very shapely flowers.
'Lalima'	H.T.	1978	Crimson-red; large, shapely.
'Lal Makhmal'	H.T.	1983	Very dark-velvety red; large symmetrical flowers; vigorous.
'Madhumati'	H.T.	1973	Pink; remarkably rich fragrance.
'Madhura'	Floribunda	1979	Yellow and pink blend; H.T.-type flowers; honey fragrance; glossy leaves; vigorous.
'Madhushala'	H.T.	1973	Mauve; large, double flowers; bushy.
'Maharani'	H.T.	1986	Two-toned pink; large, very long buds; very large, double flowers.
'Mechak'	H.T.	1979	Very dark-blackish red; long, high-centred, long-lasting flowers.
'Meghdoot'	H.T.	1972	Silky white; very large, long-pointed buds; tall.
'Nandini'	H.T.	1983	Bicoloured, pink with light yellow reverse; fragrant.
'Nayika'	H.T.	1975	Coral-orange; high-centred, lasting flowers.
'Nishada'	H.T.	1983	Pink with orange tones; long buds; very large, shapely. Intense fragrance.
'Pahadi Dhun'	H.T.	1981	Mauve blend; shapely, high-centred blooms with reflexing petals.
'Parwana'	Floribunda	1974	Very bright yellow and red blend; lasting flowers; compact.
'Patrani'	H.T.	1981	Two-toned pink; shapely, large blooms with reflexing petals.

Name	Class	Year of introduction	Brief description
'Raat ki Rani'	H.T.	1975	Velvety crimson-red; large, pointed buds.
'Ragini'	Floribunda	1972	Pink; well-spaced, big clusters.
'Raja Surendra Singh of Nalagarh'	H.T.	1977	Orange-salmon-pink; long, pointed buds; large, high-centred, double, long-lasting flowers.
'Rajbala'	Floribunda	1975	Cerise-pink; large blooms; good bunches; very vigorous.
'Rajhans'	H.T.	1983	White; very large, high-centred, shapely flowers; very sweet fragrance.
'Rampa Pal'	H.T.	1975	Pink blend; large, shapely, fully double flowers; young leaves coppery.
'Ranjana'	H.T.	1975	Geranium-lake; large, shapely buds and flowers; fragrant; vigorous.
'Ratnaar'	H.T.	1985	Pink; very large, long, pointed buds and large, double, well-shaped flowers.
'Rosy Evening'	H.T.	1985	Pink blend; shapely, large, full flowers; very fragrant.
'Sailoz Mookherjea'	Floribunda	1974	Dazzling cadmium-orange; H.T.-type, long-lasting flowers; large clusters.
'Sandeepini'	H.T.	1983	Deep pink; large, shapely, very fragrant flowers.
'Saroja'	Floribunda	1984	Deep cherry-pink, with silvery base and reverse; long-lasting flowers in small clusters.
'Sharmili'	H.T.	1986	White flushed with pink; long-lasting flowers.
'Suhasini'	Floribunda	1972	Coral-pink; very full, large and shapely flowers.

Name	Class	Year of introduction	Brief description
'Surkhab'	H.T.	1976	Bicoloured, red and white reverse; large, shapely, very double flowers; fragrant.
'Surya Kiran'	Floribunda	1979	Orange; H.T.-type, well-shaped, large flowers; very large clusters; very free-flowering; vigorous.
'Sweet Innocence'	H.T.	1980	White; shapely, large flowers; very sweet fragrance.
Pathak, Raja Ram			
'Vindhyachal'	H.T.	1984	Vermilion sheen in the inside and lighter on reverse; long, pointed, well-shaped buds and flowers; vigorous.
Patil, B.K.			
'Clg Pussta' ('Clg New Daily Mail')	Climber	1987	Climbing sport of the dark-red Floribunda 'Pussta'.
'Ico'	Floribunda	1985	Light purple; sport of 'Deep Purple'; big clusters.
'Ico Beauty'	H.T.	1985	Pink sport of 'Red Planet'; shapely buds; high-centred.
'Malkarsiddha'	H.T.	1987	Porcelain-pink, very large, sweetly scented. Sport of 'Century Two'.
'Swagatam'	H.T.	1987	Light-pink, 'hand-painted' stains on inside of petals with apricot-shaded white reverse; sport of 'Surkhab'.
'Yashwant'	H.T.	1985	Stripes and splashes of white and yellow on inside and light red on reverse; sport of 'Suspense'.
Phadalore, G.K.			
'Balwant'	H.T.		Apricot; sport of 'Christian Dior'; huge, shapely, well-formed flowers.

Name	Class	Year of introduction	Brief description
Pradhan, S.K., Rauf, A., Murmu, L. and Ghosh, P.			
'Tata Centenary'	H.T.	1974	Purple-mauve, striped with pale yellow, while reverse is clean yellow; sport of 'Pigalle'.
Ram, Bharat			
'Climbing Mister Lincoln'	Climber	1974	Climbing sport of 'Mister Lincoln'.
'Dr Bharat Ram'	Floribunda	1983	Creamy-white sport of 'Sea Pearl'.
Rangan, G. Kasturi			
'Adora'	H.T.	1986	Coral-orange to vermilion; shapely blooms.
'Agnihotri'	H.T.	1981	Rose-red blend; large, high-centred flowers.
'Ambica'	H.T.	1976	Vermilion-orange; medium, well-formed blooms.
'Arati'	H.T.	1975	Two-toned pink; long, pointed buds; high-centred blooms.
'Archana'	H.T.	1977	Bicoloured pink; shapely, large, double flowers.
'Arkavathi'	Floribunda	1971	Light red; huge clusters; free-flowering; compact bush.
'Aswini'	H.T.	1972	Ruby-red; shapely, double, well-formed flowers.
'Bhairavi'	H.T.	1977	Deep-blackish-velvety red; large shapely flowers with reflexed petals; scented.
'Bharani'	Polyantha	1973	Magenta-mauve with white eye; numerous clusters; unusual colour.
'Bhavani'	H.T.	1986	Salmon-orange to vermilion, shapely, very large flowers.
'Blue Delight'	H.T.	1980	Mauve; large, shapely blooms; strong fragrance.

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Name	Class	Year of introduction	Brief description
'Cauvery'	H.T.	1973	Blackish crimson-red; free-blooming.
'Chaitra'	H.T.	1972	Vermilion-red; long-lasting, shapely flowers.
'Chandrika'	Miniature	1978	Greenish-white to pure-white buds and flowers; continuous free-flowering.
'Chitrangini'	H.T.	1971	Multicoloured, light yellow-pink, turning orange and red.
'Chitrarangini'	H.T.	1985	Multicoloured, ivory-white blend with pink and red; shapely, double flowers; very vigorous.
'City of Panjim'	H.T.	1972	Large pink and off-white bicolour; scented.
'Clg Guitare'	Climber	1974	Climbing form of Floribunda 'Guitare'.
'Clg Kronenbourg'	Climber	1973	Climbing form of 'Kronenbourg'.
'Dazzler'	Miniature	—	Deep pink; five-petalled flowers; huge clusters.
'Dazzling Flame'	Miniature	1976	Flame-coloured sport of 'Darling Flame'.
'Gayatri'	H.T.	1973	Red blend; shapely, high-centred flowers.
'Godavari'	H.T.	1987	Vermilion; shapely, large, double flowers.
'Gomathi'	H.T.	1987	Beautiful well-shaped flowers of flesh-pink, with darker edges.
'Harangi'	H.T.	1976	Red blend with yellow reverse; shapely buds.
'Hemavathi'	Floribunda	1975	Salmon-orange deepening to smoky colour; well-spaced huge trusses.
'Jambun'	Floribunda	1978	Plum-purple-red with crimson; large H.T.-type flowers; free-flowering.

Name	Class	Year of introduction	Brief description
'Janaki'	Floribunda	1978	Scarlet-red with salmon shades; continuous flowering.
'Jwala'	Floribunda	1973	Scarlet-vermilion; full, double and shapely.
'Kabini'	H.T.	1978	Red with smoky shading; shapely buds; high-centred, long-lasting blooms.
'Kalpana'	H.T.	1978	Red blend; large, double, long-lasting blooms.
'Kanva'	H.T.	1974	Salmon-pink; shapely buds; very large blooms.
'Krithika'	H.T.	1975	Pale flesh-pink with buff-yellow; shapely, large, double blooms.
'Kumari'	Floribunda	1982	Pink; shapely; H.T.-type, lasting flowers.
'Kushal'	Floribunda	1974	Vermilion; very full flowers borne freely in well-spaced small trusses.
'Lavanya'	H.T.	1976	Deep rose-pink and rosy red; medium, high-centred, shapely flowers.
'Lemon Time'	H.T.	1985	Lemon-yellow; large, high-centred, double flowers.
'Narmada'	Floribunda	1977	Pink with darker edges; semi-double, lasting flowers.
'Nartaki'	Polyantha	1974	Deep bluish lavender, with yellow stamens.
'Netravathy'	Floribunda	1975	Pink; compact trusses; free bloomer.
'Pastel Delight'	H.T.	1984	Clean pastel pink; well-formed, shapely, lasting flowers.
'Pink Spray'	Polyantha	1986	Pink; huge clusters; free-flowering.
'Pushkala'	Miniature	1973	Pure white; huge clusters of tiny flowers; free-flowering.

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Name	Class	Year of introduction	Brief description
'Rare Edition'	Floribunda	1982	Scarlet with white splashes and stripes; well-spaced trusses.
'Rashmi'	Polyantha	1977	Deep blackish crimson; globular flowers; very free-flowering.
'Red Recker'	H.T.	1986	Non-fading deep crimson; shapely buds; high-centred, lasting flowers; erect, long stems.
'Sharavathi'	Floribunda	1977	Vermilion-orange; 4 or 5 lasting flowers in a cluster.
'Shimsha'	H.T.	1976	Two-toned pink; shapely, large flowers.
'Shyamala'	H.T.	1972	Soft pale pink; shapely long buds and flowers.
'Siddhartha'	H.T.	1973	Stripes and splashes of white and green on red; sport of 'Christian Dior'.
'Sukanya'	H.T.	1979	Two-toned pink; long slender buds; high-centred, large blooms; very fragrant.
'Sushma'	Floribunda	1975	Lavender-pink; full double flowers; large trusses.
'Tapti'	H.T.	1978	Pastel pink; high-centred, turning to cupped; spicy fragrance.
'Thungabhadra'	H.T.	1985	Coppery orange and carmine with yellow base; shapely flowers.
'Vaishnavi'	H.T.	1975	Light red; shapely large, very double flowers on long stems.
'Vasavi'	H.T.	1976	Non-fading blackish red; double; high-centred flowers.
'Veena'	Floribunda	1972	Coral-pink; double flowers borne singly or in clusters.
Saxena, P.			
'Banaras Dawn'	H.T.	1977	Apricot with gold at base of petals; shapely, double flowers; fragrant.

Name	Class	Year of introduction	Brief description
Sen, N.C.			
'Supriya'	H.T.	1982	Cream and white splashes and stripes on pink flowers; sport of 'Princess Margaret of England'.
Singh, S. Kashmir			
'Daljeet'	H.T.	1983	Soft apricot; exhibition-quality blooms; sweet-scented.
Singh, Sukhdeo			
'Clg Miss Harp'	Climber	1979	Climbing sport of 'Miss Harp'.
Swadesh Kumar			
'Clg Avon'	Climber	1975	Climbing sport of 'Avon'.
Tejganga Roses			
'Kirang'	H.T.	1984	Cream to yellow with pink margins; sport of 'Tata Centenary'.
'Soft Corner'	H.T.	1985	Soft lavender, well shaped; in other respects like 'Paradise', of which this is a sport.
Thakur, Arpi			
'Ajanta'	H.T.	1978	Light lavender with light-green veins at base of petals; large, high-centred blooms.
'Landour'	Climber	1978	Cartridge-buff with Begonia-rose on edges and cream base; very large blooms; fragrant.
'Rangoli'	Floribunda	1978	Bicoloured, deep coral-pink with cream on reverse; H.T.-type blooms.
'Sahasradhara'	H.T.	1981	Deep pink with white streaks and splashes; very large, fragrant blooms; sport of 'Century Two'.

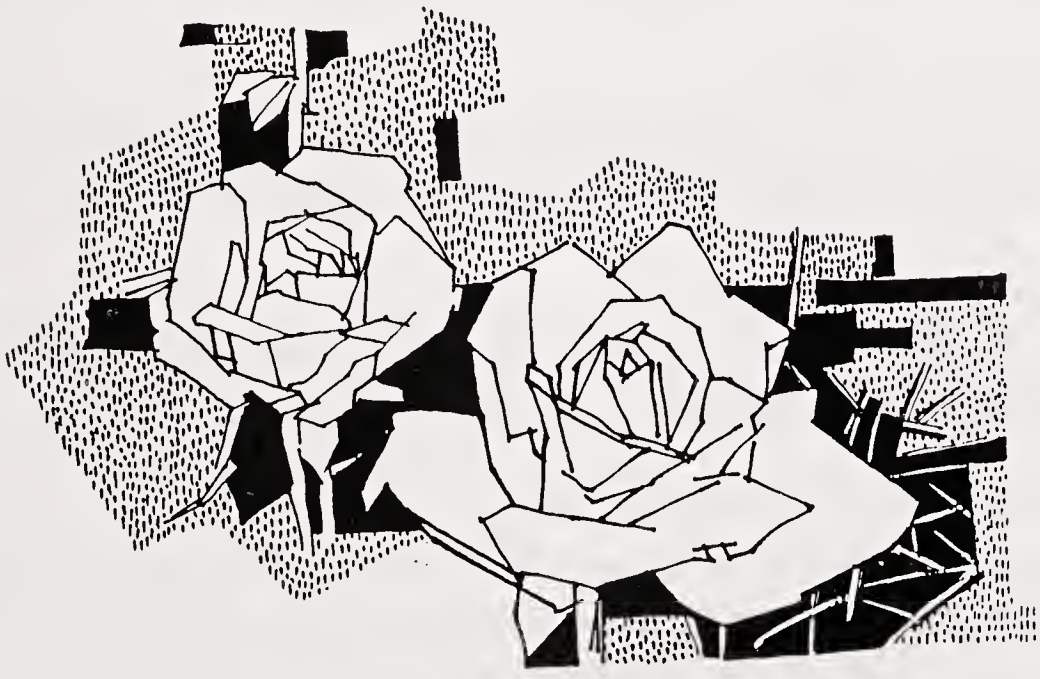
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Name	Class	Year of introduction	Brief description
TISCO Nursery			
'Anand Karnad'	H.T.	1971	Pink blend; large, cupped flowers; profuse flowering, sport of 'Montezuma'.
'Blushing Belle'	Floribunda	1981	Pink with deeper reverse; well-spaced clusters; free-flowering, dwarf.
'Hope'	Floribunda	1981	Pink; 6-8 flowers in a cluster; profuse flowering.
'Jamshedji Tata'	H.T.	1981	Purplish red with lighter pink striations; large, high-centred blooms; sport of 'Klaus Stortebeker'.
'Pioneering Pilot'	H.T.	1982	Purplish red; large, high-centred blooms, strong fragrance.
'Suvarnarekha'	H.T.	1981	Deep vermilion-orange with golden-yellow stripes; sport of 'Soraya'.
'Scope'	H.T.	1981	Variable white stripes on salmon-orange background; sport of 'Montezuma'.
'Ma Rankini'	H.T.	1982	Shapely velvety-red blooms.
Vinayananda, Swami			
'Swami Sivananda'	H.T.	1974	White; large flowers.
Viraraghavan, M.S.			
'Abhaya'	H.T.	1984	Pastel salmon to creamy vermilion with white reverse; double, shapely flowers.
'Abhaya '87'	H.T.	1987	Large ovoid buds, open to enormous well-shaped flowers of dark pink marked with dark-red markings and white reverse.
'Achanta'	Floribunda	1987	H.T.-type; dark-blackish-red buds open to velvety-crimson flowers; singly and in clusters.

Name	Class	Year of introduction	Brief description
'Amrapali'	Floribunda	1979	Salmon-pink, shaded amber and lilac; ovoid buds; small clusters.
'Bhagmati'	Floribunda	1977	Bicoloured, Anthurium-scarlet with ivory-white reverse; long-lasting flowers.
'Chitrarekha'	H.T.	1982	Wine-red-striped, pale-pink exhibition blooms; sport of 'Chitralekha'.
'Dharmapuri'	H.T.	1978	Brick-red shading to rose-red; shapely buds; profuse flowering.
'First Offering'	Floribunda	1973	Scarlet-crimson with orange shade; compact, very large trusses.
'Kadambari'	Floribunda	1976	Pastel orange, edged lac-red, centre and reverse ivory; medium, double flowers.
'Kanchi'	H.T.	1976	Magenta-cerise and purple, lighter reverse; shapely, large, double flowers.
'Kanyakumari'	Climber	1979	Salmon-orange, shaded coral; well-shaped, lasting flowers, 3 in a cluster.
'Kovalam'	Floribunda	1976	Creamy white; rounded, amber-brown buds; fragrant.
'Mahadev'	Floribunda	1975	Vermilion-orange; buds and blooms are shapely.
'Nayintara'	Floribunda	1982	Pink, blend in the 'hand-painted' series; ovoid buds; high-centred blooms.
'Nefertiti'	H.T.	1985	Shades of orange and gold; long, pointed buds; shapely high-centred blooms.
'Priyamvada'	H.T.	1985	'Hand-painted' strain; milky white, edged pink, with salmon shading in centre.
'Priyatama'	H.T.	1981	'Hand-painted' strain; blend of pink, white and red; shapely, high-centred flowers.

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Name	Class	Year of introduction	Brief description
'Rajni'	H.T.	1984	Pink with lilac shading; very large blooms; fragrant.
'Somasila'	H.T.	1987	Shapely buds of soft pink with garnet shading; large blooms, strong fragrance.
'Sonmarg'	Floribunda	1983	Golden yellow, dense green foliage, fragrant.
'Vanamali'	H.T.	1979	Lavender; dark-mauve buds; large, high-centred flowers; tea fragrance.



A SELECT LIST OF ROSE VARIETIES

HYBRID TEAS

'ABHAYA '87' (Viraraghavan, 1987)

Large ovoid buds, open to enormous well-shaped flowers of dark pink, with red markings, and white reverse.

'ABHISARIKA' (I.A.R.I., 1977)

Striped sport of 'Kiss of Fire'. Red stripes on yellow background. Fine flower shape and profusely blooming.

'ACE OF HEARTS' (Kordes, 1981)

A superb red-crimson rose with a velvety sheen. Pointed buds open out slowly to large, full, high-centred classic blooms. Profusely blooming.

'AKEBONO' (Kawai, 1964)

A Japanese rose of great beauty. The high-pointed fragrant blooms of exquisite form are light yellow, flushed and edged carmine.

'ALEC'S RED' (Cocker, 1970)

Deep-crimson, huge, well-formed flowers with superb fragrance. Strong bushy growth and ample glossy foliage.

'AMERICAN HERITAGE' (Lammerts, 1965)

Beautifully shaped, high-centred blooms with reflexing petals. The large flowers are creamy yellow, charmingly tinted with pink or even vermilion and crimson. Vigorous upright growth, handsome foliage.

'AMISTAD SINCERA' (Camprubi, 1963)

Better known under its commercial synonym, 'Sincera'. Bud ovoid, flower large, double, high-centred to cupped. Colour, white.

'ANGELIQUE' (Kordes, 1981)

Luminous bright vermilion-orange. Long and large elegant buds borne on long stems, open out to shapely perfect flowers. Fragrant.

'ANTIGONE' (Gaujard, 1969)

Pointed buds open out to large yellow flowers shaded orange-red. The flower retains its beauty after opening, as the yellow develops orange-pink flushes.

'ANVIL SPARKS' (Meyer, 1961); also known as 'AMBOSSFUNKEN'

An exquisite rose of unusual colour, having splashes, stripes and spots of yellow on coral-red petals. The flowers are shapely and fragrant but open quickly.

'APOLLO' (Armstrong, 1971)

Slender, long-pointed buds, produced on long, thornless stems, open out to large flowers having the charming fragrance of an 'old-fashioned' Tea rose. The colour is described as 'sunrise-yellow'.

'APSARA' (Pal, 1982)

Immaculate buds, produced on very long upright stems, open out slowly to beautiful many-petalled shapely flowers of flesh-pink with shadings. Vigorous and floriferous. A hybrid of 'Sonia Meilland' and 'Sabine'.

'AQUARIUS' (Armstrong, 1971)

Deep-pink buds; flowers light pink, with deep-pink edges, on long stems.

'ARIANNA' (Meilland, 1968)

High-centred, large flowers of warm coral, lightly splashed with rose-carmine on the outer petals. Strong tea scent.

'ARJUN' (I.A.R.I., 1980)

Elegant, pointed buds open out to high-centred blooms of porcelain-rose colour with a tinge of vermilion. Very vigorous bush having very long shoots.

'AVON' (Morey, 1961)

Deep-crimson flowers of large size. The buds are extremely beautiful, though the flower has only a moderate number of petals. The plant is tall, bushy and vigorous. It is delightfully fragrant. Good for bedding and cutting, and may occasionally provide an exhibition bloom. It also makes a strong, well-balanced Standard rose.

'Bajazzo' (Kordes, 1961)

A striking bicoloured rose with rich red on the inside of the petals and grey-white on the reverse. The somewhat loosely formed blooms are very large and produced freely. Tall and vigorous, it is good for bedding and cutting.

'Bel Ange' (Lens, 1962)

Tight, tapering buds of coppery pink with a paler centre, open out to shapely blooms of long-lasting quality.

'Belle of Punjab' (Pal, 1965)

Beautifully shaped buds open out to flowers of medium size, often produced in small clusters, of a lovely shade of warm pink. Upright growth.

'Bhim' (I.A.R.I., 1970)

Flowers very large, bright red, with many petals and some fragrance. The fully open blooms are striking. Stands up to cold nights. Vigorous.

'Blue Moon' (Tantau, 1964); also known as 'Mainzer Fastnacht' and 'Sissi'

Described sometimes as ice-blue or pigeon-blue, this is one of the best of the lilac-hued roses. The long, slender buds are specially appealing. Delightfully fragrant.

'Bonne Nuit' (Combe, 1956)

This is one of the darkest roses. The full, well-formed fragrant flowers are of a very dark velvety-blackish red, which does not fade or burn.

'Brandy' (Christensen and Swim, 1982)

Burnt orange buds slowly open out to classic buds of rich golden-apricot colour. Very vigorous. Fragrant.

'Cara Mia' ('Dearest One') (McDaniel's Miniature Roses, 1969)

Flower large, double, deep red. The fragrance has sometimes been described as Wild Briar. Good for bedding, cutting and exhibition.

'Careless Love' (Conklin, 1955)

One of the most striking and unusual roses, and suitably named too. The camellia-like blooms are predominantly pink, with fancy white stripes on the petals. The bush is very strong and vigorous. Some shoots bear pink or almost white flowers without any stripes; these should be removed.

'CARINA' (Meilland, 1963)

Rhodamine-pink, large, high-centred, fragrant. Upright, bushy, free-blooming. Excellent both for garden use and for forcing for the cut-flower trade.

'CATHERINE DENEUVE' (Meilland, 1981)

Elegant and very decorative buds open out to very clean, perfect, well-shaped flowers of a superb blend of salmon.

'CENTURY TWO' (Armstrong, 1971)

Long-lasting shapely blooms having deep pink on the outside of the broad petals with a warmer flush on the inside, having delicious fragrance, are borne singly or several together. Very floriferous and vigorous.

'CHAMBE DI KALI' (Pal, 1983)

Large, shapely buds open out to well-formed flowers with broad petals of clear bright pink. Free-flowering. Vigorous plant has large shiny foliage.

'CHANTRÉ' (KORDES, 1958)

The colour is sometimes termed Chinese orange, but is a most attractive and eye-catching blend of fawn-and-orange shades. The bud is very large and high-centred, making it excellent for exhibition.

'CHARLES MALLERIN' (Meilland, 1947)

Blackish-velvety red flowers of huge size with reflexed petals. At its best it is one of the loveliest of all roses; in addition, it has the old rose scent.

'CHERRY BRANDY' (Tantau, 1965)

Large fragrant flowers of light vermilion on a gold base. Lovely colour. Flowers open quickly.

'CHICAGO PEACE' (Johnston, 1962)

A true colour sport of 'Peace', having all the fine qualities of that variety. The predominant colour is shimmering pink, with blending glints of canary-yellow or copper.

'CHRISTIAN DIOR' (Meilland, 1958)

Very large, velvety-red magnificent blooms. The flowers open slowly, keeping their shape for several days. The only thing it lacks is appreciable

fragrance. One of the outstanding red varieties but requires protection against Mildew.

'CLOVELLY' (Hicks, 1924)

Carmine-rose, shaded salmon. Very fine buds, carved on long, upright stems, are excellent for cutting.

'COMMAND PERFORMANCE' (Lindquist, 1970)

A bright and graceful orange-red rose with petals of heavy texture. Fragrant. Tall and long-stemmed. Good for exhibition.

'CONDESA DE SÁSTAGO' (Dot, 1930)

Inside of petals red, outside yellow. Flowers large and loosely formed. Although now an old rose, it does well and is still popular in India. Useful for bedding and for cut flowers.

'CONFIDENCE' (Meilland, 1951)

Very large pale-satin-pink flowers of beautiful shape are freely produced. The scent, somewhat similar to that of 'La France', is exquisite. At its best in slightly warm weather, when it is a rose difficult to surpass. Fine for bedding, cutting or exhibition.

'CYNTHIA' (Warriner, 1975)

Beautiful, pink-ruby-red buds unfurl into ideally shaped blooms of deep, vibrant rose-pink. Fragrant large flowers with splendid form and colour.

'DIE WELT' (Kordes, 1976); also known as 'WORLD ROSE'

Attractive orange blend. Flowers large, high-centred. Foliage glossy. Upright, vigorous.

'DISCO' (Weeds, 1980)

One of the brightest bicolours. Long, pointed buds open out to perfect, high-centred, large full blooms of lively-red inside and creamy-white reverse, with reflexing petals.

'DIVA SWAPNA' (Pal, 1981)

Pink and white; lovely buds borne on stiff stems open out to long, high-centred flowers with reflexing petals. Strong fragrance.

'Docteur Valois' (Mallerin, 1950)

A popular bedding variety for its striking bicolour effect. The large, abundant but rather thin blooms are bright geranium, shaded vermilion, with yellow reverse. The fragrance is pleasing, said to be reminiscent of Freesias. Glossy foliage. One of the brightest garden roses.

'Doris Tysterman' (Wisbech, 1975)

Magnificent, perfectly shaped flowers of eye-catching tangerine-orange, deepening at the edges. Vigorous, upright well-branched bush.

'Double Delight' (Swim and Ellis, 1977)

An outstanding rose. Exquisitely formed buds open from deep buttercup-yellow-centred petals lightening into creamy-white dipping outer edges and usually double row of outer petals in attractive cherry-red colour. Highly fragrant.

'Dr B.P. Pal' (I.A.R.I., 1980)

Attractive luminous lilac-pink; shapely buds open out to exquisitely shaped high-centred blooms. Vigorous, tall, upright bush.

'Dr Homi Bhabha' (Pal, 1968)

Very large, pure-white double flowers of exquisite shape. The open flowers do not show empty centres. Selected from a natural cross of 'Virgo'.

'Duet' (Swim, 1960)

A lovely variety, producing a delicate bicolour effect. The medium-sized blooms are soft salmon-pink, with a rich rose-pink on the reverse. They are produced in clusters. The bush is vigorous and very free-flowering.

'Dutch Gold' (Wisbech, 1977)

Deep-yellow, fragrant blooms freely produced on a vigorous bush.

'Eiffel Tower' (Armstrong and Swim, 1963)

Extraordinarily long pink buds on very long stems are a feature of this variety, which is also very fragrant. Tall-growing.

'Eiko' (Suzuki, 1978)

This striking Japanese rose has high-centred blooms of yellow, heavily splashed with red. Profuse flowering.

'ENA HARKNESS' (Norman, 1946)

Rich unfading crimson, developing a velvety texture, especially in cool weather, when it is at its best. Large blooms and exquisite buds are then freely produced. A very fine, all-round variety which, however, is not quite suitable for warmer areas. The fragrance is variable.

'EROTIKA' (Tantau, 1968); also known as 'EROICA'

Deep-crimson, large, high-centred flowers with reflexing petals; very fragrant.

'ESMERALDA' (Kordes, 1980); also known as 'KEEPSAKE'

Large buds on long stems open out slowly to big perfect flowers of deep-pink colour, with lighter reverse. Plants vigorous and upright.

'ETERNA' (Delbard, 1978)

A beautiful elegant rose of uniform soft pink. Well-formed, shapely huge flowers are long-lasting and have agreeable fragrance. A superb variety for cut blooms for its long-lasting quality.

'ETOILE DE HOLLANDE' (Verschuren, 1919)

Deep velvety-crimson. The long buds with large petals are most attractive. One of the most fragrant varieties.

'EVENING STAR' (Warriner, 1974)

Big, pointed greenish-white buds open out to radiant pure-white flowers with perfect form. Fragrant. Listed as a Floribunda in *Modern Roses 8*.

'FIRST LOVE' (Swim, 1951); also known as 'PREMIER AMOUR'

Buds long, pointed; flowers of medium size, rose to pink and slightly fragrant; blooming profuse. A very charming variety.

'FIRST PRIZE' (Boerner, 1970)

The enormous buds are of exquisite shape and give rise to extra-large long-lasting blooms of a lovely blend of light red and deep rose. Often a prize-winner at Rose Shows in Delhi.

'FOLKLORE' (Kordes, 1977)

Long, pointed, elegant shining-bright salmon buds open out to high-pointed perfect flowers of flame-orange colour with yellow reverse. Blooms shapely and produced in large number. The bush is, however, overly vigorous for a small garden.

'FONTAINEBLEAU' (Delbard-Chabert, 1967)

A very large bloom of very rich magenta-rose colour is borne on a tall plant with upright stems. Very striking.

'FRAGRANT CLOUD' (Tantau, 1963); also known as 'DUFTWOLKE' and 'NUAGE PARFUMÉ'

Rich-coral-flame flowers of large size and beautiful shape. Very fragrant. An outstanding variety.

'FRAU KARL DRUSCHKI' (Lambert, 1901); also known as 'SNOW QUEEN', 'REINE DES NEIGES' and 'WHITE AMERICAN BEAUTY'

Pure white, though the buds may have a splash of pink on the outside petals. Very large and so beautifully fashioned that it can win a prize as an exhibition bloom even today. The 'Snow Queen' is one of the great roses. The plant, very tall and extra vigorous, sometimes requires pegging down. Resents severe pruning.

'FUTURA' (Warriner, 1975)

Unfading blazing orange, deepening with age. Shapely fragrant high-pointed flowers, perfect in form. Vigorous.

'GANGA' (I.A.R.I., 1970)

Medium-sized flowers of beautiful shape are borne singly on upright stems quite freely. The colour varies from pale yellow to golden apricot. Vigorous, with handsome foliage.

'GARDEN PARTY' (Swim, 1959)

An enormous rose, with large white petals, lightly brushed with pink and rose. The centre is high and well-shaped, and the large, flaring outer petals give it size and dignity. Does not grow tall but flowers freely.

'GOLD MEDAL' (Christensen, 1983)

Long, pointed deep-gold buds with orange-red touches open out gradually to uniform golden-yellow-coloured large, elegantly shaped flowers with stiff, broad petals. Blooms in great abundance.

'GOLDEN AFTERNOON' (Pal, 1984)

Golden apricot-orange with a deeper reverse of bronzy apricot, a lovely colour. Elegant buds open out to classically shaped double flowers with a delicious fragrance. Flowers repeat quickly but open quickly. Vigorous plants with glossy foliage.

'Golden Giant' (Kordes, 1960); also known as 'Goldrausch' and 'Fievre d'Or'

Very large, full flowers of golden yellow are produced on a tall and very vigorous plant. The depth of the yellow colour is, however, variable. The leaves are large and light green. Suitable for bedding and for exhibition.

'Golden Splendor' (Jones, 1960)

Deep creamy-yellow to deeper shades, sometimes flushed with apricot and peach, characterize this handsome variety. The large buds are centred high and are well-shaped. Good for bedding and cutting.

'Granada' (Lindquist, 1963); also known as 'Donatella'

Long, urn-shaped buds, and flowers of varying shades of scarlet, nasturtium-red and lemon-yellow. Spicy fragrance. An outstanding rose with good foliage.

'Gulzar' (I.A.R.I., 1971)

Elegant buds opening out to delightfully shaped high-centred flowers of striking magenta-crimson colour with a satiny texture. Fragrant.

'Happiness' (Meilland, 1949); also known as 'Rouge Meilland'

Bright crimson-red, large, full, well-formed flowers with reflexing petals. Very free-flowering and vigorous, with long stems; for a long time it was one of the best reds for cut flowers.

'Harmonie' (Kordes, 1981)

Very large, long, pointed buds opening out spirally to high-centred blooms of deep rosy pink with a salmon tinge. Strong fragrance. Abundant bloomer.

'Haseena' (Pal, 1979)

Perfectly shaped long buds open out to large, lovely blooms of soft-pink flowers, which are long-lasting and fragrant. Raised from a cross between 'Youki San' and 'Balinese'.

'Hawaii' (Boerner, 1960)

Intense orange-coral of a purity which is maintained from its long, elegant bud to the fully developed, large, fragrant flower. Excellent, free, erect growth. Flowering profuse.

'HEART THROB' (Bhattacharji, 1963)

An outstanding variety with large, double, scarlet-red blooms which are very fragrant. The name 'Heart Throb', however, has been registered for a later variety in *Modern Roses 7* (McFarland). The name is therefore no longer valid for Bhattacharji's variety. A very good rose suited for the warmer regions of the country.

'HELMUT SCHMIDT' (Kordes, 1979); also known as 'SIMBA'

Luminous, dark-lemon-yellow beautifully shaped, high-centred flowers are borne freely on long stems. Healthy dark-green foliage. Moderate fragrance. One of the best yellow roses introduced in recent years.

'HENKELL ROYAL' (Kordes, 1964)

Blood-red. Bud long, flower large, well formed, fragrant. Suitable for exhibition also.

'HOMAGE' (Pal, 1986)

Raised from a cross between 'Sonia' and 'Princess Margaret of England', this is a beautiful variety with shapely double flowers of deep warm pink, with outerside of petals tinged lilac-pink. Blooms retain their shape and centre for a long period. Named 'Homage' as a tribute to Dr M.S. Randhawa.

'HONOR' (Warriner, 1980)

Described by the introducer as 'tall, stately, formal'. Pointed buds open out gracefully to huge, white, satiny blooms of much elegance and beauty. Fragrant.

'HOT PEWTER' (Harkness, 1980)

Glowing scarlet-vermilion, shapely flowers with lots of petals. A good variety both for exhibition as well as for cutting. Free-flowering. It has unfortunately been overlooked in north India.

'INDIAN PRINCESS' (Pal, 1980)

A beautiful rose of a novel colour from a cross between 'Super Star' and 'Granada'. Elegant, long buds open out slowly to well-formed flowers of a vibrant carmine though the outer petals are light red. The inner carmine petals have silvery edges. Well scented.

'Inge Horstmann' (Tantau, 1964)

A very elegant bicolour, with a charming blend of cherry-red and ivory reverse. Long, high-centred buds open out to large fragrant flowers.

'Inka' (Tantau, 1978)

A refined lovely transparent, pure light-salmon rose. Big bold buds open out to elegant flowers carried on strong stems.

'Invitation' (Swim and Weeks, 1961)

Long pointed buds, large double high-centred flowers. Rich salmon-pink on yellow base. Strong spicy fragrance. Vigorous, free-blooming.

'Jadis' (Warriner, 1974)

A lovely pink rose with a touch of lavender-mauve. Slender buds and exhibition-quality blooms of good substance. Rich Damask fragrance. Free-flowering.

'Janina' (Tantau, 1974)

Long and sharp elegant buds open out to flowers of good form and shape. Colour coppery with yellow undertones. Fragrant.

'Jaquina Munoz' (Dot, 1977)

Majestic flowers of intense dark scarlet-crimson with an illuminating rosy red. The large, long-lasting flowers are non-fading.

'Jawahar' (I.A.R.I., 1980)

Tight, greenish-white buds open out to perfectly shaped white flowers with slight fragrance. Free-flowering. Good for bedding and exhibition.

'Jawani' (Pal, 1985)

A striking orange-red rose. Long-lasting, double flowers of good shape are freely produced on a strong bush. A hybrid seedling of 'Samourai' and 'Louisiana'.

'John F. Kennedy' (Boerner, 1965)

Large, long, pointed, ovoid buds of clear white open out to very large, high-centred double blooms of white colour with a slight greenish tinge, borne on strong stems. Very lasting. Good for exhibition.

'June Bride' (Shepherd, 1957)

Creamy-white flowers of fine form, produced in singles or small

clusters in winter, when the size is very large. In hot weather the clusters are large but the flowers become almost semi-double. Extremely vigorous and free-flowering. Classed as a Grandiflora in America.

'JUST JOEY' (Cants, 1974)

Large shapely flowers of coppery-orange colour with frilled petal edges, produced freely. Fragrant. A popular rose because of its colour.

'KANAKANGI' (Pal, 1968)

The buds and flowers are of the richest possible shade of golden apricot, but the colour lightens after opening. Strong, delicious, Tea-type fragrance. It is a very decorative rose and is suitable for growing as a Half-Standard also.

'KANCHI' (Viraraghavan, 1976)

An outstanding rose of rich hues of magenta-cerise and purple with lighter reverse. The well-shaped flowers are large, double and scented.

'KING'S RANSOM' (Morey, 1961)

Pure, true chrome-yellow, large, very full flowers. Buds are long and slender. The plant is vigorous, with handsome foliage. Good for bedding and exhibition.

'KISS OF FIRE' (Gaujard, 1960)

A very attractive multicoloured rose with well-formed, medium-sized flowers having creamy petals, deep pink at edges and yellowish at base; sweetly scented.

'KOPPIES' (Perry, 1981)

The high-centred cream flowers suffused with light pink are excellent as cut-flowers. Plant is vigorous but not tall.

'KORANTEL' (Kordes, 1979); sometimes called 'TARENTELLA'

Large, full flower of golden yellow, edged and marked with orange-pink. Dazzling colour.

'LA JOLLA' (Swim, 1954)

Soft shades of pink blend with pastel-cream and gold petals. Buds exquisite, long, pointed and very fragrant. Vigorous bush, with green, glossy foliage.

'LADY GRADE' (Gregory, 1982)

Elegant buds open out to very shapely perfect, large, full blooms of clear orange-vermilion. Blooms good for garden, cutting and exhibition. Free-flowering.

'LADY ROSE' (Kordes, 1979)

Non-fading, shining vermilion-salmon with a yellow base. Fragrant. Beautifully shaped buds of exhibition form open out slowly to magnificent flowers with high centre borne on long stems. A continuous bloomer on a nice compact bush.

'LADY X' (Meilland, 1966)

The long slender, stylish bud opens out slowly to a double, high-centred bloom of silvery lavender-pink flower with slight fragrance. A good exhibition variety.

'LAL MAKHMAL' (Pal, 1983)

An attractive rose of rich, glowing velvety-red colour. The large symmetrical flowers are non-fading, with good petalage, and are borne on long, straight stems. Dense attractive foliage.

'LALIMA' (Pal, 1978)

Deep rose-pink buds open out to large, shapely blooms of light crimson-red, with good petalage. Fragrant blooms freely produced on strong plants. Excellent for cutting.

'LOUISIANA' (Weeks, 1969)

Elegant creamy-white flowers of classical exhibition form. Healthy dark-green foliage. Profuse blooming. Vigorous upright bush. One of the best whites for conditions similar to those of Delhi.

'LOVE' (Warriner, 1980)

A popular bicolour. Fully double flowers of an intense shade of scarlet-red with reverse of silver-white are produced on long stems in profusion. Spicy fragrance.

'LOVER'S MEETING' (Gandy, 1980)

Beautiful, high-pointed exhibition blooms of a distinctive shade of brilliant, clean, Indian orange, freely produced on long stems. Medium-sized, upright growing bush.

'MAHARANI' (Pal, 1986)

Very large flowers of a beautiful shade of deep pink, the colour being deeper on the outside of petals, giving it a two-toned effect. The long-lasting blooms are borne on strong stems. The fully open blooms are also very attractive.

'MARIA CALLAS' (Meilland, 1965); also known as 'MISS ALL-AMERICAN BEAUTY'

Giant-sized well-shaped flowers of a deep rose-pink are freely produced on a vigorously growing plant. A full-bosomed beauty which attracts attention. Very fragrant.

'MASCOTTE' (Meilland, 1977)

An eye-catching bicolour of cardinal-red with centre and reverse of yellow, giving a glowing effect. Beautifully shaped flowers of 40 petals. Good for both garden and exhibition. Compact bush with glossy foliage.

'MATTERHORN' (Armstrong and Swim, 1965)

Long, shapely buds of majestic size are borne on tall upright stems with extra-large foliage. The white has a golden shading like a sunrise on a snowy peak.

'MCGREDY'S SUNSET' (McGredy, 1936)

Deep-yellow flowers, flushed with orange and scarlet in cool weather. Described abroad as of medium size; in northern India it freely produces 12–16-cm. blooms. The colour becomes light yellow in warm weather. The petals have good substance and look beautiful even when they fall on the ground. The plant is vigorous, though only of medium height, with very handsome foliage.

Surely this is one of the best decorative roses and is good for bedding. Though many roses suffer from cold nights, the colour of the 'McGredy's Sunset' improves and sparkles.

'MECHAK' (Pal, 1979)

Beautiful, long, shapely buds of blackish red open out to high-centred perfectly shaped flowers of deep ebony-red with blackish-velvety shading. Lasting flowers are freely produced. Good for cutting.

'MEDALLION' (Warriner, 1973)

Large double blooms of apricot-buff changing to apricot-pink colour are long-lasting and have fruity fragrance.

'MICHÈLE MEILLAND' (Meilland, 1945)

Delicate, translucent pink buds so perfect that they seem to be made of porcelain! The beauty of the blooms in the cool months has to be seen to be believed. In summer there is sometimes an amber or light-apricot shading. In the northern plains, the buds open out to beautiful large flowers and one is surprised to read that in some countries the bloom is classified as small. It is sweetly fragrant and is one of the best varieties for bedding or for exhibition.

'MIRATO' (Tantau, 1974)

Well-formed large flowers of pink-shaded salmon. Excellent and pleasing bud and bloom formation. A good exhibition rose.

'MISTER LINCOLN' (Swim and Weeks, 1964)

A very large velvety-red rose of perfect form, with strong Damask-type fragrance as would be expected from the offspring of a cross between 'Charles Mallerin' and 'Chrysler Imperial'. The flowers are borne on long stems on a tall vigorous plant. One of the best reds for Delhi.

'MRIDULA' (I.A.RI., 1975)

Very long, pinkish-white, shapely buds open out to soft white blooms of large size. Upright and very vigorously growing bush with abundant rich green foliage. Fragrant.

'MRINALINI' (I.A.R.I., 1972)

Phlox-pink, long, pointed buds open out to very large shapely, perfect blooms. Slightly fragrant. Vigorous bush. Good for exhibition and bedding.

'MONTEZUMA' (Swim, 1955)

Deep-coral flowers of large size and perfect shape. The petals are large and thick, opening out very slowly so that the bloom keeps its exquisite form for a very long period, making it ideal for exhibition. Vigorous and free-flowering but not at its best when night temperatures are very low.

'MOUNT SHASTA' (Swim and Weeks, 1962)

A well-shaped, white-flowered variety with long, pointed buds; flowers of exhibition quality. Good for both cutting and bedding.

'NORMA' (Gaujard, 1974)

Neat and elegant buds open out slowly to well-shaped flowers of good substance of rich scarlet-crimson-red colour.

'NUR JEHAN' (I.A.R.I., 1980)

Rose-Bengal-coloured well-formed blooms of very large size and high centre are borne singly on medium and strong shoots. Highly fragrant. A hybrid seeding of 'Sweet Afton' and 'Crimson Glory'.

'OKLAHOMA' (Swim and Weeks, 1964)

Velvety-blackish-red shapely blooms with a strong perfume. One of the best of the large-flowered blackish-red flowers, though very cold weather is not to its liking.

'ONLY YOU' (Meilland, 1975)

Pleasing self-pink. The buds are elegant and open to flowers of immaculate shape and form.

'ORIENT EXPRESS' (Wheatcroft, 1978)

An exciting rose with a glowing orange-vermilion with yellow reverse. Buds are elegant and the richly coloured blooms are perfectly shaped, large and full. Highly fragrant.

'PAPA MEILLAND' (Meilland, 1963)

Large, well-formed exhibition-quality blooms of rich dark red are borne on long, erect stems. The plant is vigorous and free-flowering, while the intoxicatingly strong fragrance is reminiscent of the well-loved old-fashioned roses.

'PARADISE' (Weeks, 1978)

A really impressive rose with the beautiful hues of opalescent lavender edged with rich ruby-red. Long, pointed buds open out to long-lasting blooms of perfect shape. Fragrant. One of the most successful of the recent introductions into India.

'PARTHENON' (Delbard-Chabert, 1967)

One of the loveliest roses, this pink-and-creamy-white beauty reminds one of the country girl with the milk-and-roses complexion. Very free-blooming.

'PASADENA' (Kordes, 1980)

High-centred perfect blooms of sparkling bright-orange colour that virtually glows. Flowers of lasting quality are freely produced. Ideal for cut flowers.

'PASCALI' (Lens, 1963)

One of the good whites. Beautiful, well-formed, double flowers are freely produced on a vigorous healthy bush.

'Peach Beauty' (Boerner, 1970)

Elegant peach-pink buds open out to large double blooms borne very freely on a vigorous medium bush. Excellent cut flowers of exhibition quality. A variety that merits greater popularity than it has enjoyed.

'Peter Frankenfeld' (Kordes, 1966)

Perfect blooms of rose-pink with good form and substance. Lasts long when cut. Repeats quickly. Excellent for exhibition.

'Polar Star' or 'Polarstern' (Tantau, 1982)

Large, sharply pointed, greenish-white buds develop into big perfectly formed flowers on strong stems. Fragrant. Strong growth.

'Polynesian Sunset' (Boerner, 1965)

Exquisite buds of rich coral open out to large coral-orange flowers of great beauty. Flowers come in clusters in warmer weather.

'Poornima' (Pal, 1971)

Vigorous plant with handsome foliage bears very long, shapely, light-yellow buds on long stems. The open blooms are many-petalled, with an attractive butter-yellow colour.

'Precious Platinum' (Dicksons, 1974)

Elegant buds open out to classical, perfect, high-centred, pointed blooms of deep-velvety-crimson colour.

'Princesse de Monaco' (Meilland, 1982)

An exquisitely beautiful rose. Creamy white with edges of petals bordered with deep rose-pink. Fragrant.

'Princess Margaret of England' (Meilland, 1968)

An extremely elegant rose of a bright and luminous pink. Also very free-flowering. This variety deserves better popularity than it has achieved.

'Pristine' (Warriner, 1978)

Long ivory buds brushed with pink open out to large shapely blooms of beautiful white with pink edges. Flower production moderate but the flowers are of exhibition quality.

'Priyadarshini' (I.A.R.I., 1986)

Exquisite flowers of rhodamine-pink colour suffused with deeper

pink towards the edges of petals, giving them a bicolour effect, are produced in great profusion on medium and long shoots on compact bushes.

'Raja Surendra Singh of Nalagarh' (Pal, 1977); registered as 'Raja of Nalagarh'

Large-sized, good high-centred flowers of classic shape of dazzling orange-salmon-pink colour. The buds are extremely beautiful, and the fully double large flowers have long-lasting quality.

'Rajhans' (Pal, 1983)

Very large, full, well-shaped white flowers on a vigorous bush. The strong sweet fragrance is remarkable. Good for bedding and exhibition.

'Rajni' (Viraraghavan, 1984)

Very large blooms of pink with lilac shading. Fragrant.

'Raktagandha' (I.A.R.I., 1975)

Shining-red, large, pointed buds open out to large high-centred flowers. The flowers are tolerant to winter injury.

'Ranjana' (Pal, 1975)

A pleasing rich geranium-lake colour. Urn-shaped large buds open out to shapely large, full, double flowers of exhibition quality. Fragrant.

'Ratnaar' (Pal, 1985)

Very large, well-shaped blooms of cool-pink colour with reflexed petals. Vigorous and free-flowering.

'Rina Herholdt' (Herholdt, 1959)

Beautiful, well-shaped, medium-sized, bicoloured flowers are freely produced on strong stems. The petals are white with deep-pink edges and a yellowish base.

'Roklea' (Tantau, 1980)

Very long elegant buds of glowing salmon-red lovely flowers, rather small for a Hybrid Tea, of good texture retain their shape for long. Ideal for flower arrangement.

'Rose Gaujard' (Gaujard, 1957)

Large, double, high-centred flowers. Cherry-red, reverse pale pink and ivory-white. Foliage leathery, glossy; strong stem. A sturdy variety still worth growing.

'Rosy Evening' (Pal, 1985)

Very attractive coppery-pink to flame-orange-pink blooms are well shaped, large, and freely produced on long stems. Suitable for exhibition and also for bedding.

'Royal Highness' (Swim and Weeks, 1962); also known as 'Königliche Hoheit'

Beautifully formed, high-centred, long-lasting blooms of dainty pink shades are freely produced on a bush of moderate vigour, with luxuriant shining foliage; sweet fragrance. A rose of classic perfection.

'Royal Romance' (Fryers, 1981)

A delightful rose with exquisitely formed flowers which are a glorious shade of salmon-peach to deep apricot. Free-flowering.

'Sabine' (Tantau, 1962); also known as 'Sabine Sinjen'

A lovely deep-cherry-pink rose! The slim, tapering buds develop into large, well-formed, fully double blooms, which are excellent for cutting and for exhibition. Very fragrant.

'Samourai' (Meilland, 1966); also known as 'Scarlet Knight'

Huge, blackish-red, velvety flowers are freely produced on a tall plant. They stand extremes of weather quite well. Does not provide exhibition-type specimen blooms in Delhi but is excellent as a bedding rose.

'Sincera' (Camprubi, 1963). See under 'Amistad Sincera'.

'Sonia Meilland' (Meilland, 1970)

Pure salmon-pink, large flowers are of immaculate shape and perfect form. For many years the most-sought-after cut-bloom variety all over Europe.

'Spek's Yellow' (Verschuren-Pechtold, 1947); also known as 'Golden Scepter'

This is one of the brightest yellow roses. The pointed buds open out to large, double, high-centred, fragrant blooms, freely produced on a bush of moderate growth. The foliage is leathery and glossy.

'Srinivasa' (Kasturi Rangan, 1969)

An outstanding bicoloured rose, the petals being deep rose-red with

white reverse. In very cool weather, the white disappears. The blooms are large and of perfect form, and are also quite fragrant. The plant is vigorous with handsome foliage. One of the best of the Indian-raised roses.

'SUGANDHA' (Bhattacharji, 1964)

Long buds, ranging from pure red to scarlet, open out to large, loose flowers. Most gloriously scented. The flowers, however, tend to droop.

'SUMMER HOLIDAY' (Gregory, 1967)

Large, well-formed flowers of an eye-catching shade of scarlet-vermilion. Tall and vigorous, with dark-green foliage. Very free-flowering. Good in warm weather.

'SUMMER SUNSHINE' (Swim, 1962); also known as 'SOLEIL D'ETÉ'

Delightful, pure-yellow, long-stemmed, large, perfectly formed lustrous blooms are freely produced on a plant of medium height. A valuable addition to the top-quality yellows. When introduced it was described as the 'yellowest of yellows'. Flowers retain their colour better than most other yellows.

'SUNBLEST' (Tantau, 1970); also known as 'LANDORA'

Luminous non-fading yellow. Elegant, fully double, high-centred flowers freely produced.

'SUPER STAR'(Tantau, 1960); also known as 'TROPICANA'

Variably described as pure orange, coral-orange, light vermilion, etc., this rose created a sensation when introduced. It is difficult to capture the clean luminous colour in pictures. The flowers are medium-sized but exquisitely formed and produced freely on very vigorous tall-growing bushes. Winner of many international awards.

'SURABHI' (I.A.R.I., 1975)

Phlox-pink, long-tapering buds open slowly. The large flowers have an attractive shape and long-lasting quality. A hybrid seedling of 'Oklahoma' and 'Delhi Princess'.

'SUREKHA' (I.A.R.I., 1969)

Moderately large exquisitely formed buds are produced continuously on long stems. They open out to long-lasting, coral-red, many-petalled blooms of perfect form in abundance on very healthy, tall-growing and vigorous bush. A seedling of 'Queen Elizabeth'.

'SURKHAB' (Pal, 1976)

A beautiful red-and-white bicolour, flowers are large, of good shape, borne on strong stems, and are very fragrant. Free-flowering, vigorous.

'SWARTHMORE' (Meilland, 1963)

Huge exhibition flowers of faultless shape are of rose-red colour, which may lighten to deep pink in warmer weather. In cool weather the outer petals tend to show blackish markings.

'SWEET AFTON' (Armstrong and Swim, 1964)

Beautiful long buds; flowers large, high-centred, near-white with blush-pink reverse. Tall, spreading with abundant bloom. Worth growing for its unforgettable sweet fragrance alone.

'SYLVIA ' (Kordes, 1978); also known as 'CONGRATULATIONS'

Sharp, long buds open spirally, holding the perfect shape and form to the last. Dark-salmon-pink blooms, mostly produced in singles on long stems, have mild fragrance. Very free-flowering.

'TATA CENTENARY' (Pradhan, Rauf, Murmu and Ghosh, 1974)

A striped novelty. Flowers are deep purple-mauve, splashed with pale-yellow stripes on the inside of petals and light yellow on the reverse. Huge, large, full flowers are freely produced. Fragrant. A sport of 'Pigalle'. Popular in western India.

'THAÏS' (Meilland, 1954); known in America as 'LADY ELGIN'

The beautiful, ovoid, reddish-apricot buds open out to large, double, well-formed, fragrant blooms of orange and apricot shades, borne on long stems. The bush is vigorous, upright, with dark, leathery foliage.

'TORO' (Wyant, 1972)

Large, pointed buds open out very slowly to huge, dark-red shapely blooms with strong sweet fragrance. Long-lasting exhibition quality. Does not open out well in Delhi's cold weather.

'VALENCIA' (Kordes, 1967)

The large blooms of a rich apricot-orange, with bronzy overtones, light up the garden. The buds are very elegant and open out to beautiful, fragrant flowers.

'VANAMALI' (Viraraghavan, 1979)

The streamlined buds of deep dark mauve open slowly to large high-centred flowers of orchid-lavender. Distinctive tea fragrance.

'VIOLAINE' (Gaujard, 1968)

A new colour in Hybrid Tea roses — a lovely mauve-violet pink. The flowers which are very fragrant, are freely produced, but open rather quickly in our climate.

'VIRGO' (Mallerin, 1947); also known as 'VIRGO LIBERATIONEM'

Pure-white, most exquisitely shaped buds open out to large blooms. At present still one of the best white roses in India.

'WHISKY MAC' (Tantau, 1967)

The unusual gold-shaded-bronze blooms immediately attract attention and light up the garden. The flowers are shapely but open quickly. The young foliage is bronze-coloured and very attractive. There is a strong attractive fragrance.

'WHITE CHRISTMAS' (Howard and Smith, 1953)

The huge, shapely, scented flowers are white with cream base. Good for exhibition.

'WHITE MASTERPIECE' (Boerner, 1969)

Very large, high-centred white blooms with thick satiny petals. Magnificent form from bud to bloom. One of the very few roses that produce good blooms in all seasons at Delhi.

'WINDSOUNDS' (Scoggins, 1976)

A pale-pink sport of 'First Prize'. The size and spectacular form of the parent variety is fully maintained.

'YORKSHIRE BANK' (Fryers, 1979)

A fragrant white novelty good in all weathers. Attractive blooms are very shapely and are borne freely either singly or in clusters. Strong upright growth with healthy green foliage.

FLORIBUNDAS

'AKITO' (Tantau, 1971)

Spotless graceful white shapely flowers. Very double, repeat flowering. Medium bush.

'America's Junior Miss' (Boerner, 1964)

Buds ovoid, flowers medium-sized, double, soft coral-pink and fragrant, produced in large clusters.

'Angel Face' (Swim and Weeks, 1968)

Ruby buds open out to rich, deep, sparkling rosy-lavender flowers with wavy, ruffled edges set off by an edging of royal ruby. Blooms are large and come in singles or clusters. Exquisite perfume.

'Anita' (Kordes, 1971)

Shapely durable flowers of rosy pink with golden-yellow base and reverse, borne in clusters on a dwarf bush.

'Anna Ford' (Harkness, 1980)

A Miniature-type Floribunda. Rusty orange and yellow flowers profusely produced, several together.

'Anna Wheatcroft' (Tantau, 1957)

Pale-vermilion buds open out to exquisite, single, rich-rosy-salmon flowers with high golden stamens. The floral trusses give a great display.

'Anne Harkness' (Harkness, 1979)

Shapely, neatly spaced, long-lasting flowers of good form, in saffron-orange-yellow colour. Vigorous plant. Free bloomer.

'Apricot Nectar' (Boerner, 1965)

Flowers are very large for a Floribunda and are produced in small clusters. Light apricot in colour.

'Arthur Bell' (McGredy, 1965)

The large Hybrid Tea-type flowers are of a striking rich yellow but, like many yellows, fade quickly into a lighter colour. Delightfully fragrant. Plant tall with handsome foliage.

'Arunima' (I.A.R.I., 1975)

Deep-pink, long-lasting flowers produced in small bunches in great profusion, are borne on compact bushes. A seedling of 'Frolic'.

'Banjaran' (Pal, 1969)

Well-spaced clusters of brilliant red-and-gold flowers are carried on

a plant of medium height with handsome shiny foliage. The bud shape, which is retained for a long period, is exquisite. As colourful as the gypsy woman, whose name it bears.

'BELINDA' (Tantau, 1972)

Non-fading, very fragrant shapely flowers of striking copper-gold-orange. Good for garden use and as a cut flower.

'BELLONA' (Kordes, 1975)

Long and sharp golden-yellow buds open out to long-lasting, strongly scented, Hybrid Tea-type flowers. One of the best Hybrid Tea-type Floribundas.

'BHAGMATI' (Viraraghavan, 1977)

Anthurium-scarlet with ivory-white reverse. The buds open out to lovely, long-lasting bicoloured blooms of good quality. Stands warm weather well.

'BROWN VELVET' (McGredy, 1983)

Long-lasting flowers of unusual russet-brown with reddish shadings, produced singly or in clusters on strong, tall plants.

'CHANDRAMA' (I.A.R.I., 1980)

Delicate pink buds open out to large, white, double flowers borne in clusters of 4 to 6, on sturdy shoots. Good for garden display as well as for exhibition.

'CHARISMA' (Jelly, 1977)

Large clusters of very long-lasting attractive flowers of lively flame-red and golden yellow. Repeat flowering.

'CHARLESTON' (Meilland, 1963)

A very gay rose in which the flowers change colour from yellow to orange and pink, and ultimately velvety-dark-crimson. Enormous trusses are produced on a vigorous plant.

'CHITCHOR' (Pal, 1972)

The captivating Hybrid Tea-type double flowers are white, very lightly suffused with pink, the edges being deep pink. The centre is sometimes illuminated by a pale-golden glow. Very vigorous and floriferous. A seedling of 'Pink Parfait'.

'City of Belfast' (McGredy, 1967)

Medium-sized trusses of brightest signal-red. Fine for bedding.

'City of Leeds' (McGredy, 1966)

Hybrid Tea-type flowers of an attractive rich-salmon shade in well-spaced clusters. An unusually fine Floribunda.

'Deccan Delight' (Chiplunkar, 1985)

Buds open from creamy yellow to apricot, with the outer double row of petals having orange colour, which spreads gradually inwards; finally the entire flower is an orange and white bicolour. A sport of 'First Edition'.

'Deepika' (I.A.R.I., 1975)

Pointed small buds open out to very showy flowers of mandarin-red with lighter reverse and yellow base. A seedling of 'Shepherd's Delight'.

'Deepshikha' (I.A.R.I., 1975)

Dutch-vermilion, double, open flowers are borne in small and big clusters. Produces good flowers in summer and the rainy season also.

'Deep Purple' (Kordes, 1979)

Deep-lavender-purple, Hybrid Tea-type, large, double flowers are produced singly and in clusters. Plants vigorous.

'Delhi Princess' (Pal, 1963)

Cerise-red buds open out to large flowers of sparkling deep warm pink. In cool weather the clusters are small, but the individual flowers are 10 cm. across. In warm weather large trusses are formed. Exceptionally vigorous and free-flowering in all weathers. Young foliage bronze-red.

'Elizabeth of Glamis' (McGredy, 1964); also known as 'Irish Beauty'

Deep-orange-salmon flowers which are also very fragrant. Upright and vigorous.

'Else Poulsen' (Poulsen, 1924); also known as 'Joan Anderson'

Semi-double flowers of sparkling rose-pink are produced in enormous trusses right through the rose season. Lovely for cutting. The young foliage is coppery. In Europe it has now been superseded, but in the plains of northern India this is still a most dependable variety.

'ESCAPADE' (Harkness, 1967)

Light rosy-magenta with a white centre. The semi-double flowers are produced in large heads.

'EUROPEANA' (de Ruiter, 1963)

Large, well-shaped, blooms of brilliant red are borne in huge trusses. A charming characteristic is the lovely young browny-red foliage.

'EVELYN FISON' (McGredy, 1962); also known as 'IRISH WONDER'

Fully double blooms of unfading brilliant red are carried in large, well-spaced trusses. The bush is strong and vigorous with dark-green foliage.

'FANCY TALK' (Swim and Weeks, 1965)

Neat, sparkling-pink double flowers profusely produced on a compact bushy plant. One of the best of the so-called 'Talk' series.

'FIRST EDITION' (Delbard, 1976)

Pointed buds of luminous coral, shaded orange, burst out to shapely attractive flowers borne in large clusters. One of the outstanding Floribundas of recent years.

'FLAMENCO' (McGredy, 1960)

Lovely deep-salmon blooms are produced in trusses, which keep their colour all the time. A good rose for garden display and for potting. Especially good in warmer weather.

'FRENCH LACE' (Warriner, 1982)

Large perfect Hybrid Tea-type blooms of ivory-white. Elegant buds open out to large blooms of fine form, with spicy fragrance.

'FUGITIVE' (Pal, 1965)

Buds pointed, flowers semi-double, open, apricot-yellow, becoming lighter. Large clusters; foliage glossy, bronzy. Very vigorous. A seedling of 'Mrs Oakley Fisher', a well-known old variety.

'GENE BOERNER' (Boerner, 1968)

Double Hybrid Tea-type blooms are freely produced in clusters. The colour is clear, deep pink.

'GOLDEN RAYS' (Airun, 1976)

Perfectly shaped Hybrid Tea-type blooms of a dazzling golden yel-

low, with a suggestion of red on the outer petals, appear in small clusters. Well scented.

'Golden Times' (Kordes, 1976)

Bright, clean yellow. Blooms either in singles or in clusters. Free-flowering and long-lasting.

'Happy Wanderer' (McGredy, 1972)

Shapely flowers of velvety scarlet-crimson. Prolific bloomer.

'Himangini' (I.A.R.I., 1968)

Ivory-white, medium-sized flowers are borne in enormous trusses. An outstanding Floribunda.

'Iceberg' (Kordes, 1958); also known as 'Schneewittchen' and 'Fée des Neiges'

Bud pointed, flower large, double, open, very fragrant, pure white. The flowers are borne in large clusters on vigorous bushes with exceptionally healthy foliage. Flowers with the utmost prodigality. Makes a fine Half-Standard or Standard. One of the best of the Floribundas which has done well throughout the world.

'Jantar Mantar' (Pal, 1980)

A very floriferous Floribunda bearing excellent red blooms on long stems. Vigorous.

'Judy Garland' (Harkness, 1978)

Very attractive flowers of deep yellow, edged with fiery orange-red. Large Hybrid Tea-type shapely flowers are produced in small trusses. A really eye-catching Floribunda.

'Kavita' (I.A.R.I., 1972)

The open flowers come in attractive shades of orient-pink with light-yellow base of the petals. Vigorous. A seedling of 'Margaret Spaull'.

'Laminuette' (Lammerts, 1969); also known as 'Minuette'

Shapely, perfect white flowers, with beautiful light-red border are lasting. Useful for cut flowers also.

'Little Darling' (Duehrsen, 1956)

Medium-sized double flowers red-orange to rose-pink, with yellow

base, are produced in clusters in abundance. The colour is really delightful, and the buds are specially attractive. The plant is very vigorous and tall.

'LOREE' (Pal, 1969)

Extremely pale-pink, fragrant double flowers are borne in very large clusters on a plant of medium height. The buds are exquisitely shaped. The colour deepens slightly in very cool weather and becomes almost egg-white in warm weather. A very soothing colour and a desirable variety.

'LORNA DOONE' (Harkness, 1970)

Large, double blooms of crimson-scarlet, produced freely in small clusters.

'MADHURA' (Pal, 1979)

The charming Hybrid Tea-type flowers are a lovely blend of light yellow and pink. The flowers are freely produced in singles and small clusters on a vigorous plant, and have honey fragrance.

'MARGARET MERRIL' (Harkness, 1977)

The delightful white Hybrid Tea-type flowers with a lovely sheen of satin-pink have a nice form and are highly fragrant. Produced in huge trusses. Excellent growth.

'MARINA' (Kordes, 1974)

Long and sharp buds of orange colour open out slowly to attractive flowers with yellow overtures, borne on strong, erect stems.

'MERCEDES' (Kordes, 1974)

The shapely, long-lasting flowers are attractive Granada-red with petal edges becoming darker. An important variety in the cut-flower trade.

'MOONSPRITE' (Swim, 1956)

Flowers medium-sized, very double, cupped, very fragrant, creamy white, with pale-gold centre, borne in rounded clusters. Foliage leathery, semi-glossy. Plants dwarf and bushy, flowering profusely.

'NAVNEET' (I.A.R.I., 1971)

Creamy-white, beautiful, semi-double flowers, large for a Floribunda, are produced in small and big bunches on long and strong shoots. Profusely flowering, vigorous, spreading bush with large, green foliage. Good for bedding.

'Nav Sadabahar' (I.A.R.I., 1980)

A bud sport of 'Sadabahar' with white streaks on the original deep-pink colour.

'Neelambari' (I.A.R.I., 1975)

Beautifully formed pointed buds develop into full blooms of classic rose form and magenta-rose colour. The flowers are borne freely in singles as well as in small and big bunches.

'Orangeade' (McGredy, 1959)

Blooms of dazzling, pure orange, single to semi-double, carried on nicely spaced trusses. Very vigorous, forming a large bush. Has been a very popular Floribunda.

'Orange Sensation' (de Ruiter, 1961)

Flowers orange or light vermilion, semi-double to double, fragrant, freely produced in large clusters. A striking and dependable variety.

'Pandit Nehru' (Bhattacharji, 1964)

Dazzling vermilion to scarlet-red, pointed buds freely produced. In mild weather the blooms are quite attractive. The plant needs protection against Mildew in some areas.

'Pink Parfait' (Swim, 1960)

A blend of delicate pinks, from pale dawn-pink to a rich rose-pink at the petal edges. The colour darkens considerably with the age. Dainty buds are petite and always perfect, opening out to graceful medium-sized flowers. Free-flowering. Tall, vigorous and compact growth.

'Prema' (I.A.R.I., 1970)

Lovely, medium-sized flowers of soft pink with deep-pink edges are borne singly or in clusters. Long-lasting. Upright healthy bush. Good for bedding and also for exhibition.

'Queen Elizabeth' (Lammerts, 1954)

Flowers soft carmine-rose and dawn-pink, medium-sized, double, high-centred to cupped, fragrant, borne singly and in clusters on long, strong stems. The plants are very tall and can also be used for a hedge. A very well-known and popular variety, known for its health.

'RARE EDITION' (Kasturi Rangan, 1982)

Most attractive flowers of scarlet with white splashes and stripes, borne in clusters in well-spaced trusses. Repeat flowering. A sport of the Indian variety 'Kusum'.

'REDGOLD' (Dickson, 1967); also known as 'ROUGE ET OR'

Very lovely buds of gold with red edging are produced singly or several together. Very striking, and one of the best of the newer Floribundas.

'REGENSBURG' (McGredy, 1980); also known as 'YOUNG MISTRESS'

A most attractive 'hand-painted' rose on a low-growing plant. Lot of blooms in a delicate shade of pink with white eye and exquisite markings. It is surprising to learn that in France it is known as 'Buffalo Bill'.

'RIMOSA' (Meilland, 1979); also known as 'GOLD BUNNY'

Graceful lemon-yellow flowers in huge well-spaced trusses borne continuously. Compact plants of medium height bear flowers profusely.

'ROMAN HOLIDAY' (Lindquist, 1966)

A very vivid rose with its gay combination of orange-red and flashing yellow. Clusters are produced, especially in warmer weather. Fragrant.

'ROSE SHERBET' (Pal, 1962)

Flowers of deep pink to light red are very freely produced in clusters on a tall-growing vigorous plant. Extremely fragrant, with a Damask-type fragrance. Can be used for making a fragrant hedge.

'RUMBA' (Poulsen, 1958)

Small blooms of cherry-yellow, flecked and edged bright red, in enormous clusters. The colour effect is sensational. A well-balanced bush. The individual flowers can be used as gay buttonholes.

'RUPALI' (I.A.R.I., 1971)

Deep-rose, large flowers come in bunches of amazing size.Beautifully formed flowers are borne on long and strong shoots. Very vigorous and tall-growing bush.

'SABRE DANCE' (Bees, 1975)

Masses of Hybrid Tea-type bicoloured flowers, scarlet with golden reverse, are produced in well-spaced clusters.

'SADABAHAR' (I.A.R.I., 1969)

Deep-pink buds open out to medium-sized flowers, produced in clusters in great profusion. The medium-sized plant remains covered with a mass of flowers almost throughout the season. Ideal for bedding and border; also for Half-Standards. Very vigorous.

'SAILOZ MOOKHERJEA' (Pal, 1974)

Dazzling pure-cadmium-orange Hybrid Tea-type buds open out to long-lasting flowers with firm petals. The large clusters are produced on vigorous plants with healthy foliage.

'SCANIA' (de Ruiter, 1965)

Large, well-formed, velvety deep red. A good variety which has been overlooked. In winter the blooms are of Hybrid Tea size, while in warmer weather they are smaller but produced in clusters.

'SEA PEARL' (Dickson, 1964); also known as 'FLOWER GIRL'

Long buds and extremely lovely flowers in shades of pearly pink, peach and gold are borne on strong and upright stems. An outstanding Hybrid Tea-type Floribunda with high potential as a cut-flower variety.

'SHABNAM' (I.A.R.I., 1975)

White, compact, small flowers are produced in enormous clusters. The colour of the flower becomes icy-white in the spring flush. Upright and vigorous bush.

'SHOCKING BLUE' (Kordes, 1975)

Long and sharp buds open out to strongly scented, long-lasting flowers of magenta to lilac colour. Good for bedding.

'SHOLA' (I.A.R.I., 1969)

Dutch-vermilion buds open out to medium-sized flowers of orient-red. They are borne in clusters in great abundance. A very colourful variety.

'SHOWBIZ' (Tantau, 1984); also known as 'INGRID WEIBULL'

The bright-crimson semi-double flowers hold their brilliance well from bud to the flower stage. The ruffled flowers come in small and large clusters and repeat quickly. Vigorous.

'SHRINGAR' (I.A.R.I., 1972)

The flowers are deep camellia-rose with lighter base on reverse of petals. Semi-double long-lasting flowers are beautifully formed and borne freely both singly and in clusters.

'SINDOOR' (I.A.R.I., 1980).

The long, pointed buds open out to geranium-lake, well-formed, double and large blooms on long shoots in single and small clusters during winter flush and big clusters in the spring season.

'SOUTHAMPTON' (Harkness, 1971)

Large, double, fragrant, apricot. Foliage glossy. Free-blooming.

'STRAWBERRY ICE' (Delbard, 1978)

An eye-catching, free-flowering and attractive variety, producing clusters of huge blooms with creamy petals bordered with pink.

'SUCHITRA' (I.A.R.I., 1972)

Pink with yellow base and silvery-white reverse. Beautifully formed flowers are produced in singles and large clusters. Very floriferous.

'SUMMER SNOW' (Perkins, 1938)

Clear-white double flowers are produced in remarkable profusion in clusters. Attractive light-green foliage.

'SUN FLARE' (Warriner, 1983)

An attractive very bright lemon-yellow from bud to finish. Abundant clusters of flowers with mild fragrance produced in profusion.

'SUNSPRITE' (Kordes, 1973); also known as 'FRIESIA'

Large, non-fading, golden-yellow flowers produced in clusters are long-lasting and scented.

'SURYA KIRAN' (Pal, 1979)

Large well-shaped Hybrid Tea-type flowers of brilliant orange ageing to salmon-orange , come in large clusters on upright stems. Very vigorous.

'TIKI' (McGredy, 1964)

An extremely lovely blend of soft-pink shades. Flowers usually come in singles in northern India but are produced in sufficient number to cover the bush. A good variety for bedding.

'VALENTINE' (Swim, 1951)

A striking landscape rose. The semi-spreading, low, compact bush is constantly aglow with masses of frilly, bright-red, slightly fragrant flowers.

'VIOLET CARSON' (McGredy, 1963)

The flowers are of an exquisite peach-and-biscuit colour with a silvery reverse. One of the loveliest of the Hybrid Tea-type Floribundas.

'ZAMBRA' (Meilland, 1961)

Pure orange, with bright-yellow reverse. This sensational rose is exceedingly floriferous. The bushes are strong and healthy. One of the most 'orange' of the Floribundas bred so far, it certainly brightens up the garden. Ideal for bedding. The huge clusters are ideal for exhibition also.

'ZIZI' (Delbard-Chabert, 1963)

Medium-sized, double flowers of eye-catching deep-velvety, garnet-red colour produced freely in small and large clusters.

'ZORINA' (Boerner, 1963)

Luminous, deep-orange Hybrid Tea-type flowers are produced in large trusses on a strong plant. It is still an important variety for the cut-flower trade.

DWARF POLYANTHAS

'ANJALI' (Kasturi Rangan, 1970)

Rose-red flowers with a white eye come in huge sprays. Plants compact.

'BHARANI' (Kasturi Rangan, 1973)

Deep magenta-mauve, paling to lighter mauve with a white eye. Scented flowers are produced in very large numbers of clusters. An outstanding colour.

'CHATILLON ROSE' (Nonin, 1923)

Simply enormous trusses are produced of glowing-pink single flowers with a whitish base. The colour lasts for a long time. One of the most dependable varieties. Tall and vigorous.

'ECHO' (Lambert, 1914); also known as 'BABY TAUSENDSCHÖN'

A dwarf from 'Tausendschön', the well-known rambler. The plant is

almost smothered with clusters of large, pink and white flowers for months on end. In warm weather, only white flowers may be produced. An extremely charming variety worth growing in any garden. Almost thornless.

'IDEAL' (Spek, 1921)
Dark, velvety-crimson. The best Polyantha in this colour.

'NARTAKI' (Kasturi Rangan, 1974)
Novel, deep-lavender-blue flowers with prominent yellow stamens dancing on the petals, adding to their beauty. A delightful variety.

'PAUL CRAMPEL' (Kersbergen, 1930)
Most vividly brilliant orange-scarlet flowers.

'PRITI' (Kasturi Rangan, 1971)
Sport of 'Margo Koster'. Soft pink to white, globular flowers profusely produced.

'SNEPRINCESSE' (Bang, 1953)
Fragrant, globular flowers of pure white are freely produced.

'SWATI' (I.A.R.I., 1968)
Dainty buds of deep carmine open out to white, semi-double flowers with pink edges. Low, compact bush. Very free-flowering.

'VATERTAG' (Tantau, 1959); also known as 'FATHER'S DAY', 'FÊTE DES PÈRES' and 'JOUR DES PÈRES'
Medium-sized, globular blooms of salmon-orange are freely produced. Beautiful glossy foliage.

MINIATURES

'ANGELA RIPPON' (de Ruiter, 1978)
Delightfully fragrant, tiny, perfectly formed salmon-orange flowers with almost ever-blooming habit.

'BABY DARLING' (Moore, 1964)
Small double flowers of orange to orange-pink. Pointed buds.

'BABY GOLD STAR' (Dot, 1940); also known as 'BABY GOLD' and 'ESTRELLITA DE ORO'

Golden yellow, semi-double, open, slightly fragrant. Foliage small and soft. Flower and plant rather large for the class.

'BABY MASQUERADE' (Tantau, 1956); also known as 'BABY CARNAVAL'

Lemon-chrome progressing to rose-red, small, double, open, free, with recurrent blooming. Vigorous and compact.

'BENSON AND HEDGES SPECIAL' (McGredy, 1982)

Very shapely, non-fading pure-gold-coloured flowers, larger in size than of most Miniatures.

'BIT O' SUNSHINE' (Moore, 1956)

Small, semi-double, bright yellow, bushy, compact, profusely blooming.

'CHANDRIKA' (Kasturi Rangan, 1978)

Very free-flowering, loaded with clusters of greenish-white to pure-white buds and flowers. A delightful Miniature.

'CHATTEM CENTENNIAL' (Jolly, 1979)

Eye-catching, bright, clear-orange flowers profusely produced on a healthy plant.

'CHIPPER' (Meilland, 1966)

Lovely buds of coral to rose-red, flowers throughout the season on a strong bush.

'CHUNMUN' (Laveena Roses, 1983)

Small flowers of salmon-shaded coral produced in great profusion.

'COLIBRI' (Meilland, 1979)

Graceful, gay, orange-coloured flowers freely produced on a compact well-balanced plant.

'CRICRI' (Meilland, 1957)

Salmon-shaded coral flowers, well formed. A profusely blooming hybrid Miniature.

'CUDDLES' (Schwartz, 1978)
An outstanding Miniature. Many, long-lasting blooms of deep coral-pink, produced freely on a vigorous plant.

'CUPCAKE' (Spies, 1981)
High-centred, double, long-lasting clear-pink flowers. Compact vigorous bush with abundant foliage.

'DARLING FLAME' (Meilland, 1971)
Mandarin-red to vermilion-red. Flowers small, double. Free-blooming.

'GLORIGLO' (Williams, 1976)
Double, large, very striking orange flowers with yellow reverse, borne singly or several together.

'GREEN ICE' (Moore, 1971)
White buds change to fully double lovely blooms of ice-green colour. Can be grown to full effect in partial shade. One of the very easy-to-grow Miniatures.

'HOLY TOLEDO' (Christensen, 1978)
Long-pointed buds open out to lovely blooms of rich-apricot colour with 30 petals.

'LITTLE BUCKAROO' (Moore, 1956)
Lovely, bright, velvety-red blooms. Bronzy, glossy foliage.

'LITTLE FLIRT' (Moore, 1961)
Small double flowers are produced in clusters. The colour is orange-red with yellow reverse, giving a striking effect. Vigorous.

'MAGIC CARROUSEL' (Moore, 1972)
Glorious, long-lasting blooms of exhibition quality of red-and-white bicolour.

'MR BLUEBIRD' (Moore, 1960)
Semi-double, slightly tall. Shades of lavender-blue. Delightful.

'NEW PENNY' (Moore, 1962)
Orange-red to coral-pink. Lovely flowers.

'Over the Rainbow' (Moore, 1972)
Bright blend of red, pink and gold.

'Party Girl' (Saville, 1979)
An excellent Miniature. Soft apricot-yellow, flushed salmon-pink, fragrant flowers of good form and substance, produced one to a stem.

'Pink Petticoat' (Moore, 1982)
Creamy white brushed with deep coral-pink along edges of petals. Lovely exhibition form.

'Puppy Love' (Schwartz, 1978)
Very showy, high-centred blooms of vivid blend of orange, pink and yellow.

'Pushkala' (Kasturi Rangan, 1973)
Tiny, full, clear-white flowers, freely produced in huge clusters.

'Rise 'n Shine' (Moore, 1977)
Brilliant, clear yellow. Shapely, with reflexing petals. Probably the best yellow Miniature so far.

'Rosina' (Dot, 1951); also known as 'Josephine Wheatcroft' and 'Yellow Sweetheart'
Deep golden-yellow, well-shaped double blooms, borne in clusters; foliage glossy light green; plant dwarf, compact, profusely blooming.

'Rosmarin' (Kordes, 1965)
Lovely light pink, deeper towards the centre of the flower. A very attractive Miniature.

'Scarlet Gem' (Meilland, 1961); also known as 'Scarlet Pimpernel'
Small, cupped flowers of bright orange-scarlet. Bushy and free-blooming.

'Sheri Anne' (Moore, 1973)
Orange-red, pointed buds, fragrant. Glossy leathery foliage, free-blooming.

'Starina' (Meilland, 1965)
Full, perfect flowers of oriental-red with gold reverse. The colour is

very striking and the plant healthy and vigorous. One of the outstanding Miniatures.

'Stars 'n Stripes' (Moore, 1975)

A striking red-and-white-striped novelty with great substance. Blooms freely. Tall variety.

'Strawberry Swirl' (Moore, 1978)

A brilliant and unusual rose, striped red, white and pink. No two flowers are alike. Very double flowers look like vanilla and strawberry ice-creams. Appealing spicy fragrance. Vigorous plant.

'Toy Clown' (Moore, 1966)

White-edged red. Free-blooming. Very good.

'White Madonna' (Moore, 1973)

Flowers small double, white to pale pink. A beautiful Miniature producing large clusters.

CLIMBING MINIATURES

'Climbing Candy Cane' (Moore, 1958)

Semi-double, pink to light-red flowers with white stripes, produced in large, loose clusters. Vigorous, free-blooming.

'Clg Jackie' (Moore, 1955)

Small very double blooms, pale yellow to creamy white, free-flowering.

'Clg Magic Wand' (Moore, 1957)

Small, semi-double red blooms borne in clusters. Foliage small, dark green. Free-flowering, fairly tall.

'Nozomi' (Onodera, 1968)

A notable variety from Japan. Numerous very small, pearly-pink and white flowers. The plant clings closely to the ground and can be used as a ground cover, for Weeping Standards and also hanging baskets.

'Snow Carpet' (McGredy, 1980)

An outstanding introduction. Canes grow across the ground and

laterals grow vertically at every node with a small cluster of blush-pink flowers which turn white. Useful as a ground-cover and also creates a good effect in hanging baskets.

CLIMBERS AND RAMBLERS

'ALBERTINE' (Barbier, 1921)

Flowers large, double-cupped, fragrant, coppery-chamois, borne in clusters; vigorous, profusely blooming. Better for the hills than for the plains.

'AMERICAN PILLAR' (Van Fleet, 1902)

Flowers large, single, carmine-pink, with white eye and golden stamens, borne in large clusters on long stems. Foliage leathery and glossy. A rambler type, better in the hills.

'CASINO' (McGredy, 1963); also known as 'GERBE D'OR'

Flowers light yellow, well formed. Vigorous, profusely blooming; climbs up to about 3 metres (10 ft.); foliage glossy, dark green.

'CLG CRIMSON GLORY' (Jackson and Perkins, 1946)

Large, deep crimson, sometimes taking on purple tints in later stages. It retains the glorious Damask perfume of the bush form. One of the very best of the Hybrid Tea climbing sports, it can clothe a whole wall in beauty.

'CLG LANDORA' (Laveena Roses)

Sport of 'Landora' (syn. 'Sunblest'). Elegant yellow flowers borne on long stems. Free bloomer.

'CLG MISS HARP' (Sukhdeo Singh, 1979)

An outstanding yellow sport of 'Miss Harp'.

'CLG MRS PIERRE S. DU PONT' (Hillock, 1933)

Deep-ochre-yellow becoming lighter, medium-sized, well-shaped flowers produced in great profusion. Very vigorous and floriferous. A heavy climber. Blooms in early spring in northern India.

'CLG SHOW GIRL' (Chaffin, 1949)

Exquisite, long, pointed buds develop into large, well-shaped, full, fragrant, deep-pink, exhibition-quality blooms, borne on long stems.

'COCKTAIL' (Meilland, 1957)

Geranium-red, suffused crimson, with yellow centre, later becoming all red. Clusters of single flowers are put forth in great profusion. Perpetually flowering, not very tall. Also forms a moderately vigorous shrub.

'COMPASSION' (Harkness, 1972)

Large, Hybrid Tea-type flowers of salmon-pink-flushed apricot as it opens. Fragrant. Climbs up to about 3 metres (10 ft.).

'DANSE DU FEU' (Mallerin, 1953); also known as 'SPECTACULAR'

Bright orange-scarlet, large, double and shapely flowers. Vigorous, but not too tall. Makes a good blaze of colour on a pillar, wall or fence.

'DELHI PINK PEARL' (Pal, 1962)

Enormous clusters of pearly pink produced in spring. In warm weather the flowers become white. Vigorous growth, good foliage, thornless. A rambler sport from 'Echo', the well-known Polyantha.

'DELHI WHITE PEARL' (Pal, 1963)

A fine climbing form with small glossy-green leaves and enormous clusters of flowers, produced several times in a year. The flowers are pearly white, full and with a faint musky fragrance. It is a seedling of 'Prosperity', which it surpasses in vigour and freedom of flowering.

'DON JUAN' (Malandrone, 1958)

Flowers velvety, dark red, large, double, cupped and fragrant; recurrent and free-flowering. Dark foliage. Vigorous but not very tall-growing.

'DOROTHY PERKINS' (Jackson and Perkins, 1901)

Flowers full, rose-pink, fragrant. Foliage dark, glossy. Vigorous and profusely blooming. It does well in the hills but suffers badly from Powdery Mildew.

'GLADIATOR' (Malandrone, 1955)

Though listed as a climber in *Modern Roses 8*, it has proved to be a boon for the cut-flower trade in roses in western India. Flowers deep red, well shaped, abundantly produced on long stems. Does not open well when winter temperatures are severe in the northern plains.

'GOLDEN SHOWERS' (Lammerts, 1956)

Daffodil-yellow, fragrant flowers are produced singly and in clusters

on strong stems. Long, pointed buds open out to large, double and high-centred flowers. Recurrent-blooming and vigorous.

'Joseph's Coat' (Armstrong and Swim, 1964)

The large, double flowers range in colour from yellow to red. A gay Pillar rose which does well in the plains of northern India.

'Kanyakumari' (Viraraghavan, 1979)

Every shoot that is produced ends up with clusters of 3 flowers of salmon-orange shaded coral, which are shapely and long-lasting.

'Lamarque' (Maréchal, 1830)

Flowers white, shaded lemon, in clusters, sweetly scented. One of the best climbers for the plains. Belongs to the Noisette class.

'Mardan White'; also known as 'Cherokee'

This is *Rosa laevigata* Michaux (1759) which has been acclimatised. Large, single, elegant white flowers produced freely once a year on a very vigorous growth; foliage very beautiful, glossy green and dense. The flowering period is very short.

'Mar échal Niel' (Pradel, 1864)

Sometimes referred to as 'the classic Tea rose of the Victorian era', it was hailed as the most beautiful yellow rose in the world when it was first introduced. Flowers yellow, large, very double, well formed and beautifully scented. This famous free-flowering rose is still one of the best climbers for the plains of India. Belongs to the Noisette class.

'Mermaid' (Paul, 1917); also known as 'Bracteata Climber'

Flower primrose-yellow with amber-yellow stamens, very large, single, fragrant. Plants perpetually flowering, very vigorous, and need no pruning. Better in the hills.

'Mme Driout' (Levet, 1878)

Flowers in great profusion; pale, bright pink, streaked with bright carmine, cupped. Very vigorous. Good in the plains.

'Pinata' (Suzuki, 1978)

A very showy climber. A multitude of sunshine-yellow flowers edged orange are very bright. A good Pillar rose and also a good climber for a small garden to cover a low fence on a trellis.

'PROSPERITY' (Pemberton, 1919)

Flowers in enormous clusters, white, flushed pink in bud, medium-sized with slight musky fragrance.

Rosa banksiae Aiton f. (1796); also known as 'BANKS' ROSE', 'BANKSIAN ROSE' and 'LADY BANKS' ROSE'

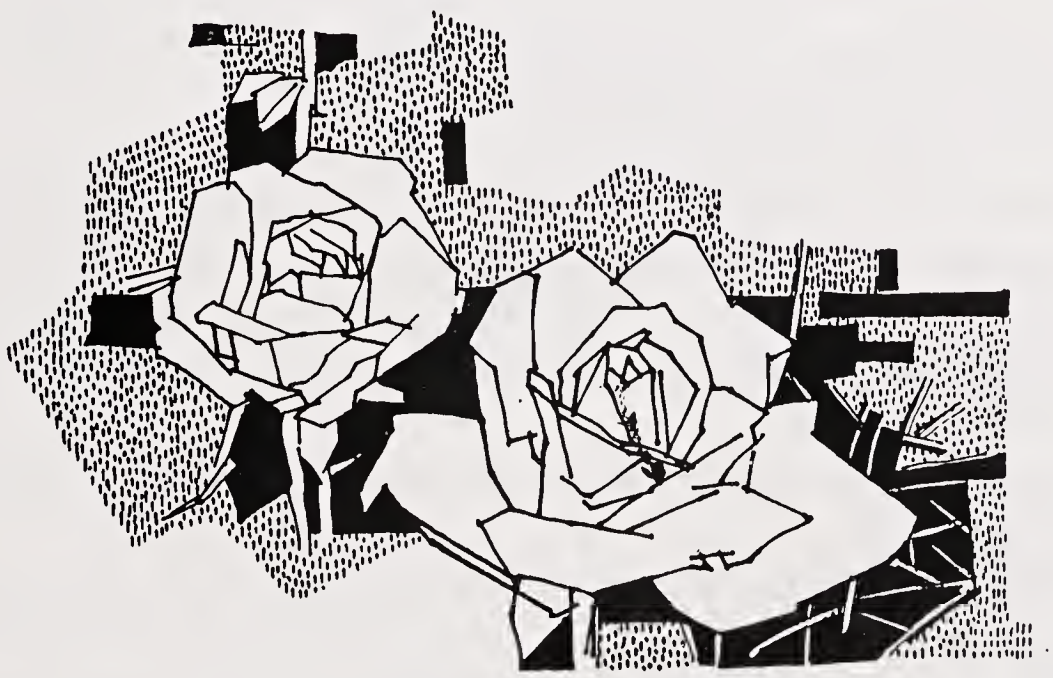
Flowers small, white or yellow, slightly fragrant, borne on slender stalks and clusters. Foliage evergreen, thornless. Both white- and yellow-flowered varieties are commonly grown in the hills. The white-flowered variety does better in the plains. Ideal for Weeping Standards.

'ROYAL GOLD' (Morey, 1957)

Golden-yellow, well-formed flowers are borne singly or in clusters. The colour lasts till the flowers fade. Vigorous.

'VEILCHENBLAU' (Schmidt, 1909); also known as 'VIOLET BLUE'

Flowers small, semi-double, cupped, violet with white centre, which mature to a bluish-lilac and finally lilac-grey, borne in large clusters on short stems. Foliage large, glossy and light green. Very vigorous grower. Blooms freely, especially in the hills.



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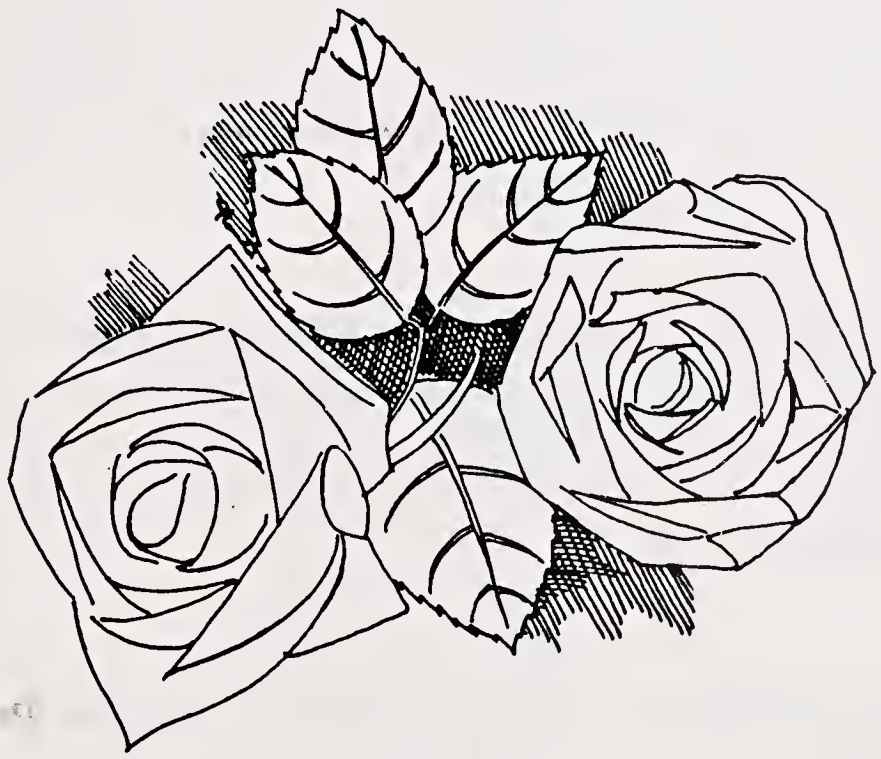
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A SHORT LIST OF ROSE BOOKS

Indian Books

THE oldest book printed in India dealing entirely with roses was probably G.B. Patwardhan's *A Guide to Rose Culture in Bombay Presidency*, published in 1914, followed by R. Ledlie's, *A Handbook on Rose Culture in India*, in 1923. The next appears to have been B.S. Bhatcharji's *Practical Rose Growing in India*, published in 1935 and revised and enlarged under the title *Rose Growing in the Tropics*, which came out in 1959. After that the first and second editions of the present book, *The Rose in India*, became available in 1966 and 1972. On all these going out of print, V.S. Padhye's *Roses for Pleasure and Profit* entered the market in 1983, and T.D. Biswas's *Rose Growing: Principles and Practices* followed in the next year. *All About Roses*, a paperback by the present author, first published in 1973, reached its tenth edition in 1987. The apparently overly-ambitious book title was used to enable the slim volume to fit into the publisher's series of titles beginning with 'All About...'.

Books from Abroad

A very large number of books about roses have been published, some of them very fine indeed. I have given below only a very small number of them which I thought would be of interest to rose-lovers in this country. The book by J.L. Harkness contains outstanding colour plates of a number of roses, wild and cultivated.

General Books

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Harkness, J.L. *The World's Favourite Roses and How to Grow Them*, 184 pp. McGraw-Hill Book Company. New York (1979).

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A SHORT LIST OF ROSE BOOKS

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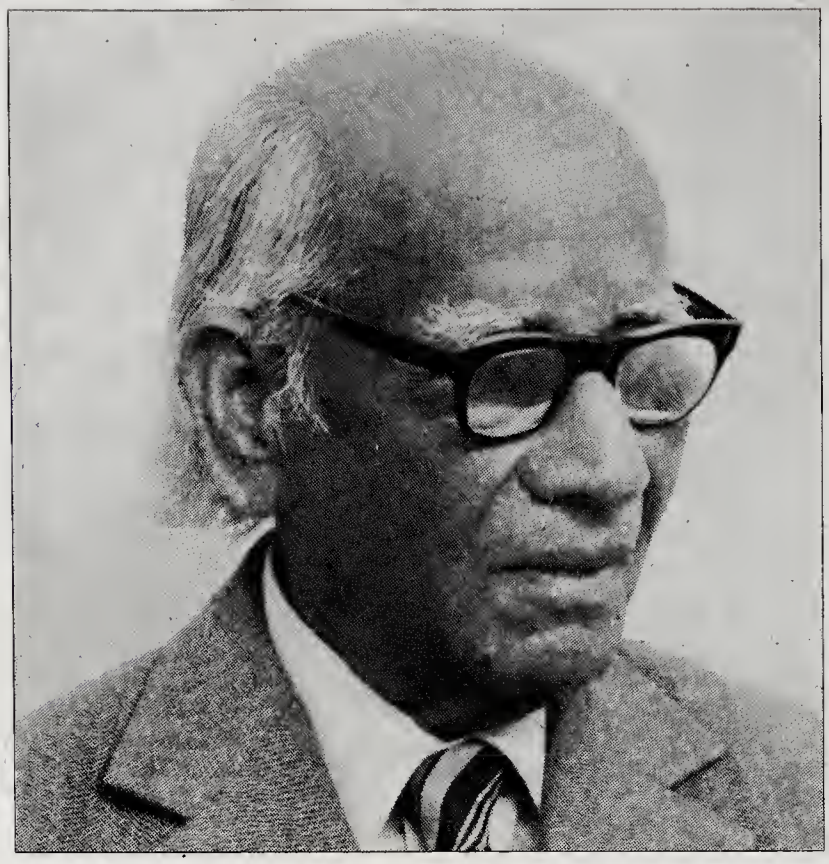
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Dr B.P. Pal

26 May 1906–14 September 1989

The Author and His Book

'The Rose in India is almost a stranger in the modern world, for with science at the highest level it combines practical garden knowledge, historic interest and aesthetic appreciation in the manner that used to grace the writings of eminent scientists long ago', wrote Professor Sir F.L. Engledow, FRS, about the first edition.

The present edition, the third, which is thoroughly revised and enlarged, contains 23 chapters and is profusely illustrated with colour photographs of some of the most strikingly beautiful rose varieties suitable for cultivation.

A plant breeder of repute, Dr Pal is well known for his work on crop improvement, in particular for evolving rust-resistant varieties of wheat. Recipient of many awards and honours and member of several learned societies in India and abroad, Dr Pal was elected Fellow of the Royal Society in 1970, and received the Padma Vibhushan award in 1989.

From his boyhood days in Burma, growing roses was Dr Pal's passionate hobby. He developed several interesting rose varieties, among his successes being 'Dr Homi Bhabha', 'Delhi Princess', 'Banjaran'', 'Apsara', 'Dilruba', 'Pahadi Dhun', 'Saroja', 'Mechak' and 'Homage'. An active participant at rose shows, Dr Pal won several trophies, including the ICI Challenge Trophy for developing new seedling rose, which he won ten times. In 1988 he received the Vijay Pokarna Gold Medal of Honour from the Indian Rose Federation.

President Emeritus of the Rose Society of India, and Member of the Royal National Rose Society and the American Rose Society, Dr Pal is eminently qualified to write on roses in India. His book contains ample material of interest to the professional; but it is written in a clear personal style with simple hints and directions so that it is equally valuable for the new-comer to the world of roses.

SOME OPINIONS ON THE FIRST EDITION

Even to those remotely interested in roses, here is the final, definitive, comprehensive manual, undoubtedly a labour of love.

The Statesman, March 26, 1967

...written in an easy flowing style, not without wit and charm, an eminently readable book.

The Rose (U.K.), Vol. 15, No. 3, Summer 1967

There is an extensive index, and the illustrations in colour, black and white, and line, add lustre to a fine publication.

Nancy Steen in *New Zealand Gardener,* April 1967

Rosarians everywhere will enjoy reading this book, partly because the author so clearly knows and loves his subject; partly because of his often humorous and always pleasing style...

E.F. Allen in *The Rose Annual* (Royal National Rose Society, U.K.), 1968

I have not seen a better production from any country.

A.S. Thomas in *The Australian Rose Annual,* 1968

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